

# Series 3023 Three-Way

## Two-position High-Pressure Control Valves

Designed for diverting or blending applications.



*The Norriseal Series 3023 is a three-way, two-position high-pressure control valve designed to handle the tough problem of system switching when high differential and static pressures are prevalent. While maintaining high flow capabilities, these valves can be expected to give positive shut-off, so that the different systems remain separated.*

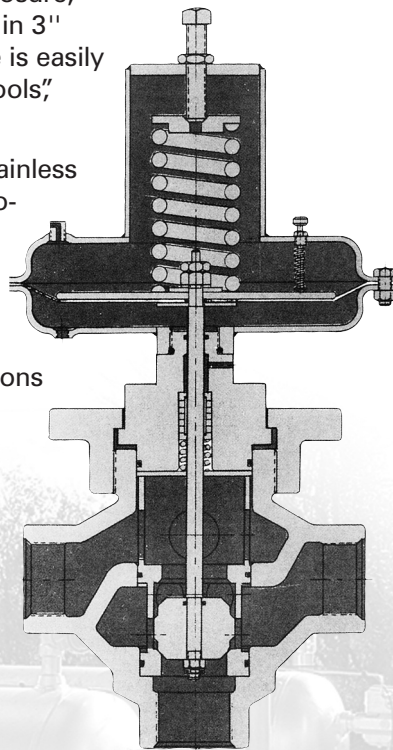
Featuring a cast steel body and hammer nut closure, this series has a CWP of 3600 psig. (3000 psig in 3" size). The construction is such that field service is easily accomplished with the standard "roustabout tools," a hammer and a crescent wrench.

The value of internal construction, featuring stainless steel plug, seats and cages, will resist the corrosion and erosion effects associated with high pressure oil and gas service.

A wide range of seals and trim is available for severe corrosive or abrasive applications. The factory should be consulted for recommendations for such service.

### Features

- Hammer-nut closure with hard, soft and blowcase trim options
- Reverse acting, direct acting or pressure balanced
- Teflon V ring, spring-loaded, non-adjustable packing
- Optional open yoke



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**Engineered  
Performance**

# Specifications

## Materials of Construction

|                                  |                          |
|----------------------------------|--------------------------|
| ■ <b>Body</b>                    | Cast Steel ASTM A216 WCB |
| ■ <b>Seats</b>                   | 17-4 PH Stainless Steel  |
| ■ <b>Plug</b>                    |                          |
| <i>Hard –</i>                    | 17-4 PH Stainless Steel  |
| <i>Soft –</i>                    | Synthetic Plastic Insert |
| ■ <b>Stem</b>                    | AISI Stainless Steel     |
| ■ <b>Bonnet &amp; Hammer Nut</b> | Steel                    |
| ■ <b>Diaphragm Case</b>          | Pressed Steel            |
| ■ <b>Diaphragm</b>               | Buna N w/Nylon Insert    |

## Trim Size (Available in Both Hard & Soft Styles)

| Valve Size | Trim Size   |
|------------|-------------|
| 1          | 1"          |
| 2          | 1.5" and 2" |
| 3          | 2" and 3"   |

Special hard trim for blow case application  
 $\frac{3}{8}$ " lower /  $\frac{3}{4}$ " upper (1" valve only)

## Actuator

|                           |   |
|---------------------------|---|
| ■ <b>Action</b>           | Reverse, Direct<br>Pressure Balanced                                |
| ■ <b>Sizes</b>            | No. 9 (35 sq. in.)<br>No. 12 (70 sq. in.)                           |
| ■ <b>Working Pressure</b> | PSI      Normal      Maximum  |
|                           | No. 9      30              125                                      |
|                           | No. 12    30              50  |
| ■ <b>Travel</b>           |   |
|                           | 1, 2 & 3" Valves $\frac{3}{8}$ ", $\frac{3}{4}$ " & 1" respectively |

## Temperature Range

- -20° to 180° F

## Packing

Standard packing material is non-lubricated teflon V-ring packing with brass or stainless steel retainers. The teflon V-ring packing is spring loaded and requires no adjustment.

**TABLE 1: MAXIMUM DIFFERENTIAL PRESSURES ( $\Delta P$ )**

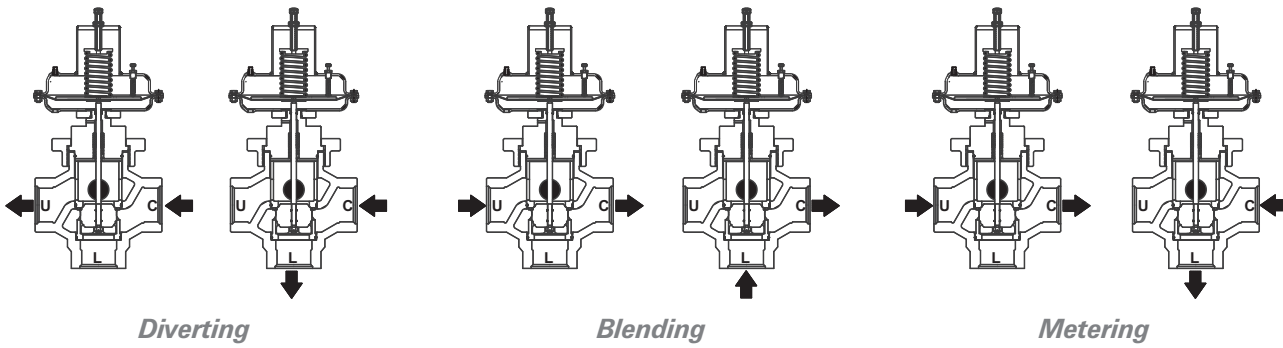
| Valve Size | Orifice Size | Actuator & Spring | (Diverting) Flow Over Plug |                   | (Blending) Flow Under Plug |                   | Metering Service |         |                   | Soft Trim Maximum |
|------------|--------------|-------------------|----------------------------|-------------------|----------------------------|-------------------|------------------|---------|-------------------|-------------------|
|            |              |                   | Direct or Reverse          | Pressure Balanced | Direct or Reverse          | Pressure Balanced | Direct           | Reverse | Pressure Balanced |                   |
| 1*         | 1            | #9 – Std          | 800                        | –                 | 400                        | –                 | 500              | 800     | –                 | 800               |
|            |              | #9 – None         | –                          | 1000              | –                          | 1000              | –                | –       | 1000              | 1000              |
|            |              | #12 – Light       | 1000                       | –                 | 800                        | –                 | 810              | 1000    | –                 | 1000              |
|            |              | #12 – None        | –                          | 1000              | –                          | 1000              | –                | –       | 1000              | 1000              |
| 2          | 1½           | #12 – Light       | 450                        | –                 | 275                        | –                 | 310              | 730     | –                 | 730               |
|            |              | #12 – Heavy       | 600                        | –                 | 190                        | –                 | 670              | 190     | –                 | 670               |
|            |              | #12 – None        | –                          | 1000              | –                          | 920               | –                | –       | 1000              | 900               |
|            | 2            | #12 – Light       | 250                        | –                 | 150                        | –                 | 150              | 380     | –                 | 380               |
|            |              | #12 – Heavy       | 400                        | –                 | 90                         | –                 | 310              | 190     | –                 | 400               |
|            |              | #12 – None        | –                          | 590               | –                          | 490               | –                | –       | 530               | 450               |
| 3          | 2            | #12 – Light       | 250                        | –                 | 120                        | –                 | 130              | 310     | –                 | 310               |
|            |              | #12 – Heavy       | 400                        | –                 | 40                         | –                 | 220              | 55      | –                 | 400               |
|            |              | #12 – None        | –                          | 590               | –                          | 475               | –                | –       | 500               | 450               |
|            | 3            | #12 – Light       | 110                        | –                 | 45                         | –                 | 45               | 125     | –                 | 125               |
|            |              | #12 – Heavy       | 200                        | –                 | 15                         | –                 | 85               | 17      | –                 | 200               |
|            |              | #12 – None        | –                          | 265               | –                          | 200               | –                | –       | 210               | 200               |

NOTE: Maximum differential pressures are for 30 psi supply pressure and are for the same differential on both ports. Spring type actuators can be adjusted to provide higher  $\Delta P$  for one port with lesser  $\Delta P$  on the other. The maximum  $\Delta P$  is limited to 1000 psig to insure normal valve life. Higher  $\Delta P$  capability is available on application. For any requirements beyond the above table please consult factory.

\*Reduced trim in 1" valve available for blow-case application – 1200 lbs. Delta P w/#9 reverse actuator.

### Spring Description

|            |           |
|------------|-----------|
| Standard – | 2-3020-19 |
| Light –    | 3-3020-20 |
| Heavy –    | 1-2200-57 |



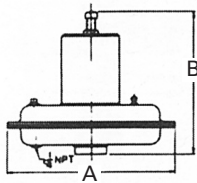
**TABLE 2: FLOW CAPACITY**

| Valve Size | Orifice Size | Flow Pattern** | CV   | Water* (Barrels per day)<br>Delta P |        |        |        |        | Gas<br><br>Use the following formula to determine gas capacity:<br><br>$Q = 963Cv \sqrt{\frac{\Delta P}{SG} \frac{(P_1 + P_2)}{T}}$<br><br>Q – Gas Flow (SCFH)<br>P <sub>1</sub> – Upstream Pressure<br>P <sub>2</sub> – Downstream Pressure or 50% of P <sub>1</sub> , whichever is higher (psia)<br>ΔP – (P <sub>1</sub> – P <sub>2</sub> ) (psi)<br>T – Operating Temperature<br>SG – Specific Gravity |
|------------|--------------|----------------|------|-------------------------------------|--------|--------|--------|--------|---|
|            |              |                |      | 1                                   | 5      | 10     | 20     | 50     |   |
| 1          | 1            | C – U          | 9    | 308                                 | 690    | 976    | 1,381  | 2,185  | 3,009   |
|            |              | C – L          | 12.5 | 429                                 | 957    | 1,358  | 1,918  | 3,035  | 4,250   |
| 2          | 1½           | C – U          | 38   | 1,302                               | 2,910  | 4,130  | 5,840  | 9,220  | 13,030  |
|            |              | C – L          | 51   | 1,750                               | 3,910  | 5,540  | 7,840  | 12,390 | 17,500  |
|            | 2            | C – U          | 46   | 1,579                               | 3,520  | 4,990  | 7,060  | 11,160 | 15,780  |
|            |              | C – L          | 66   | 2,260                               | 5,060  | 7,160  | 10,120 | 16,020 | 22,620  |
| 3          | 2            | C – U          | 48   | 1,645                               | 3,675  | 5,210  | 7,360  | 11,620 | 16,450  |
|            |              | C – L          | 68   | 2,330                               | 5,210  | 7,380  | 10,420 | 16,500 | 23,330  |
|            | 3            | C – U          | 105  | 3,600                               | 8,050  | 11,400 | 16,100 | 25,470 | 36,000  |
|            |              | C – L          | 150  | 5,150                               | 11,490 | 16,290 | 23,000 | 36,400 | 51,500  |

\* 42 gallons per barrel of water at 60° F. For specific gravity correction, multiply by  $\sqrt{S.G.}$

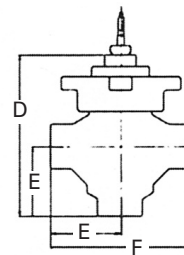
\*\* Reverse flow pattern Cv will be 95% of values listed.

## Dimensions



**ACTUATOR DIMENSIONS (INCHES)**

| Actuator Size | A   | B    |      |         |
|---------------|-----|------|------|---------|
|               |     | Rev. | Dir. | Bal.    |
| 9             | 9½  | 9½   | 11¼  | 5 7/16  |
| 12            | 12½ | 11½  | 13¾  | 5 11/16 |



| Body End Connections    | 1"    |         |         | 2"     |          |         | 3"      |                |         |        |
|-------------------------|-------|---------|---------|--------|----------|---------|---------|----------------|---------|--------|
|                         | D     | E       | F       | D      | E        | F       | D       | E              | F       |        |
| Screwed                 | 7¾    | 3⅛      | 6¼      | 12¼    | 5¼       | 10½     | 14 7/16 | 6              | 12      |        |
| Butweld                 | 7 5/8 | 3       | 6       | 12 1/8 | 5 1/8    | 10 1/4  | 14 5/16 | 5 7/8          | 11 3/4  |        |
| Socket Weld             | 7¾    | 3⅛      | 6¼      | 12¼    | 5¼       | 10½     | 14 7/16 | 6              | 12      |        |
| Flanged Raised Face     | 150   | 8¼      | 3 5/8   | 7¼     | 13½      | 6½      | 13      | 16 3/16        | 7¾      | 15½    |
|                         | 300   | 8½      | 3 7/8   | 7¾     | 13½      | 6½      | 13      | 16 3/16        | 7¾      | 15½    |
|                         | 400   | 8¾      | 4⅛      | 8¼     | 14¾      | 7¾      | 15½     | 16 3/16        | 7¾      | 15½    |
|                         | 600   | 8¾      | 4⅛      | 8¼     | 14¾      | 7¾      | 15½     | 16 3/16        | 7¾      | 15½    |
|                         | 900   | 9 5/16  | 4 11/16 | 9 3/8  | 14¾      | 7¾      | 15½     | 18 1/16        | 9 5/8   | 19¼    |
|                         | 1500  | 9 5/16  | 4 11/16 | 9 3/8  | 14¾      | 7¾      | 15½     | Not Applicable |         |        |
| Flanged Ring Type Joint | 150   | 8 7/16  | 3 13/16 | 7 5/8  | 13 11/16 | 6 11/16 | 13 3/8  | 16¼            | 7 13/16 | 15 5/8 |
|                         | 300   | 8 11/16 | 4 1/16  | 8 1/8  | 13¾      | 6¾      | 13½     | 16¼            | 7 13/16 | 15 5/8 |
|                         | 400   | 8¾      | 4⅛      | 8¼     | 14 13/16 | 7 13/16 | 15 5/8  | 16¼            | 7 13/16 | 15 5/8 |
|                         | 600   | 8¾      | 4⅛      | 8¼     | 14 13/16 | 7 13/16 | 15 5/8  | 16¼            | 7 13/16 | 15 5/8 |
|                         | 900   | 9 5/16  | 4 11/16 | 9 3/8  | 14 13/16 | 7 13/16 | 15 5/8  | 18 1/8         | 9 11/16 | 19 3/8 |
|                         | 1500  | 9 5/16  | 4 11/16 | 9 3/8  | 14 13/16 | 7 13/16 | 15 5/8  | Not Applicable |         |        |

# How to Order

1. Select the valve by the body size and series.  
Example: 3-3023 for a 3023 series with a 3" connection.
2. Select the proper model number.
3. Specify trim type and size.
4. Specify flow pattern or actuator spring required.

IMPORTANT: Every valve has a serial number. This serial number must be furnished when ordering spare parts.

| BODY CONNECTION         |      |
|-------------------------|------|
| Type                    | Code |
| Screwed (Female)        | S    |
| Flanged Raised Face     | RF   |
| Flanged Ring Type Joint | RJ   |
| Beveled Buttweld        | B    |
| Socket Weld             | W    |

| BODY PRESSURE RATING |      |      |
|----------------------|------|------|
| ANSI                 | CWP  | Code |
| 150                  | 285  | 02   |
| 300                  | 740  | 07   |
| 600                  | 1480 | 14   |
| 900                  | 2220 | 21   |
| —                    | 3000 | 30   |
| 1500                 | 3705 | 36   |

| SERVICE  |      |
|----------|------|
| Type     | Code |
| Standard | —    |
| NACE     | N    |

| ACTUATOR TYPE                     |      |
|-----------------------------------|------|
| Style                             | Code |
| Reverse-Spring Closing Lower Port | T    |
| Direct-Spring Closing Upper Port  | B    |
| Pressure Balanced                 | P    |

| ACTUATOR SIZE (PNEUMATIC ONLY) |                 |                  |
|--------------------------------|-----------------|------------------|
| Code                           | Normal Diameter | Spring Selection |
| 9                              | 9½              | Std.             |
| 12H                            | 12½             | Heavy            |
| 12L                            | 12½             | Light            |

NOTE: No. 9 actuator available on 1" valve only

| PACKING |               |             |
|---------|---------------|-------------|
| Code    | Material      | Load Type   |
| —       | Teflon V Ring | Spring Load |
| A       | Teflon V Ring | Adjustable  |

| SEALS |          |                |
|-------|----------|----------------|
| Code  | Material | Temp-Range     |
| A     | Buna N   | -20° to 180° F |
| V     | Viton    | -20° to 180° F |

| BODY STYLE |                  |
|------------|------------------|
| Code       | Type             |
| W          | 3-Way 2-Position |

**RF14 - TWA - 12H**

Please note: not all available options are shown.

Please contact your Norriseal representative for more details and assistance in specifying the optimal solution for your application.



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