

FTV-S (Straight) & FTV-A (Angle Body)

Tri-Service Valve

SERVICE RECOMMENDATIONS:

The Model FTV-S & FTV-A Tri-Service Valve is primarily designed for installation in pump discharge piping where it functions as a spring loaded silent check valve, flow control valve and shut off valve.

OPERATION:

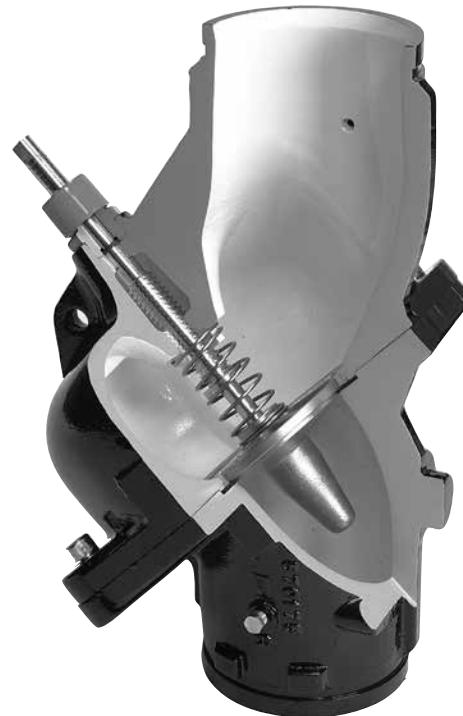
The Model FTV Tri-Service Valve operates automatically and silently. Line pressure of approximately $\frac{1}{4}$ PSI will open the disc. The spring closes the disc as the line flow approaches zero in order to prevent flow reversal & water hammer. The flow through the valve can be adjusted from bubble tight shut off to full flow by the threaded rising stem.

FEATURES:

The unique convertible body design permits the valve to be changed on site from the straight to the angle configuration.

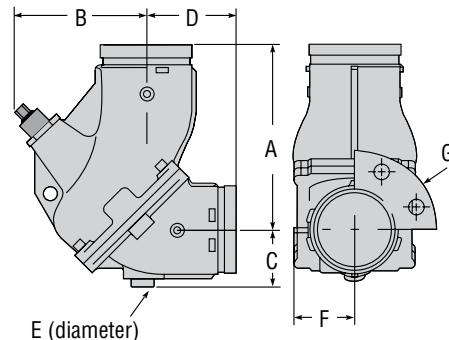
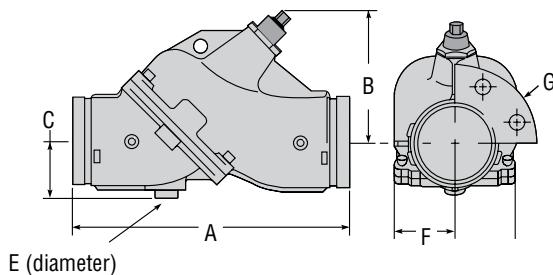
Flow measurement (where an approximate indication is acceptable) is obtained by flow measuring ports on each side of the valve seat. Pressure differential is easily recorded using differential pressure measurement devices. If precision accuracy is required, we recommend that a Gruvlok® Circuit Balancing Valve be installed downstream from the FTV valve.

See pages 3-5 for installation instructions and flow data.



FTV-S (Straight) & FTV-A (Angle Body)

Tri-Service Valve



MODEL FTV-S (STRAIGHT)

| Connection Size | A | B (fully open) | C | E | F | Flange 125/150 PSI G | Flange 250/300 PSI G | Approx. Wt. Each |
|-------------------------------------|---|---|--|-------------------------------------|--|---------------------------------------|---------------------------------------|------------------|
| In./mm | In./mm | In./mm | In./mm | In./mm | In./mm | In./mm | In./mm | Lbs./Kg |
| 2 ¹ / ₂ 65 | 12 305 | 7 178 | 2 ³ / ₄ 70 | 1 | 2 ⁹ / ₁₆ 25 | 7 178 | 7 ¹ / ₂ 191 | 19 9 |
| 3 80 | 12 305 | 7 ¹ / ₁₆ 198 | 2 ⁷ / ₁₆ 62 | 1 | 3 25 | 7 ¹ / ₂ 80 | 8 ¹ / ₄ 191 | 24 11 |
| 4 100 | 14 356 | 8 203 | 3 80 | 1 ¹ / ₄ 32 | 3 ⁷ / ₁₆ 87 | 9 ¹ / ₄ 235 | 10 254 | 42 19 |
| 5 125 | 17 ¹ / ₂ 445 | 10 ¹ / ₈ 257 | 3 ⁵ / ₈ 92 | 1 ¹ / ₄ 32 | 4 ¹⁵ / ₁₆ 125 | 10 254 | 11 279 | 81 37 |
| 6 150 | 20 ¹¹ / ₁₆ 525 | 10 ³ / ₈ 264 | 4 ⁷ / ₁₆ 113 | 2 51 | 5 ⁷ / ₈ 149 | 11 279 | 12 ¹ / ₂ 318 | 120 54 |
| 8 200 | 28 ³ / ₁₆ 716 | 22 ¹³ / ₁₆ 579 | 5 ¹¹ / ₁₆ 144 | 2 ¹ / ₄ 57 | 7 ⁷ / ₈ 200 | 13 ¹ / ₂ 343 | 15 381 | 300 136 |
| 10 250 | 30 762 | 28 ⁵ / ₈ 727 | 6 ⁹ / ₁₆ 167 | 2 ¹ / ₄ 57 | 9 ¹⁵ / ₃₂ 241 | 16 409 | 17 ¹ / ₂ 445 | 450 204 |
| 12 300 | 38 ¹ / ₁₆ 967 | 32 ⁵ / ₈ 829 | 7 ⁵ / ₈ 194 | 2 ¹ / ₄ 57 | 12 ⁵ / ₈ 321 | 19 483 | 20 ¹ / ₂ 521 | 850 390 |

See Page 50 for O.D. Size

MODEL FTV-A (ANGLE)

| Connection Size | A | B (fully open) | C | D | E | F | Flange 125/150 PSI G | Flange 250/300 PSI G | Approx. Wt. Each |
|-------------------------------------|---|--|--|---------------------------------------|-------------------------------------|--|---------------------------------------|---------------------------------------|------------------|
| In./mm | In./mm | In./mm | In./mm | In./mm | In./mm | In./mm | In./mm | In./mm | Lbs./Kg |
| 2 ¹ / ₂ 65 | 7 ³ / ₈ 187 | 7 178 | 2 ³ / ₄ 70 | 4 ⁵ / ₈ 117 | 1 25 | 2 ⁹ / ₁₆ 65 | 7 178 | 7 ¹ / ₂ 191 | 19 9 |
| 3 80 | 8 ³ / ₁₆ 208 | 7 ¹³ / ₁₆ 198 | 2 ⁷ / ₁₆ 62 | 3 ⁷ / ₈ 98 | 1 25 | 3 80 | 7 ¹ / ₂ 191 | 8 ¹ / ₄ 210 | 24 11 |
| 4 100 | 9 ⁵ / ₈ 244 | 8 203 | 3 80 | 4 ³ / ₈ 111 | 1 ¹ / ₄ 32 | 3 ⁷ / ₁₆ 87 | 9 ¹ / ₄ 235 | 10 254 | 42 19 |
| 5 125 | 12 305 | 10 ¹ / ₈ 257 | 3 ⁵ / ₈ 92 | 5 ¹ / ₂ 140 | 1 ¹ / ₄ 32 | 4 ¹⁵ / ₁₆ 125 | 10 254 | 11 279 | 81 37 |
| 6 150 | 14 ¹ / ₈ 359 | 10 ³ / ₈ 264 | 4 ⁷ / ₁₆ 113 | 6 ⁵ / ₈ 168 | 2 51 | 5 ⁷ / ₈ 149 | 11 279 | 12 ¹ / ₂ 318 | 120 54 |
| 8 200 | 18 ¹⁵ / ₁₆ 481 | 18 ³ / ₄ 476 | 5 ¹¹ / ₁₆ 144 | 9 ³ / ₁₆ 233 | 2 ¹ / ₄ 57 | 7 ⁷ / ₈ 200 | 13 ¹ / ₂ 343 | 15 381 | 300 136 |
| 10 250 | 20 ⁵ / ₁₆ 516 | 24 610 | 6 ⁹ / ₁₆ 167 | 9 ³ / ₄ 248 | 2 ¹ / ₄ 57 | 9 ¹⁵ / ₃₂ 241 | 16 409 | 17 ¹ / ₂ 445 | 450 204 |
| 12 300 | 24 ¹ / ₁₆ 611 | 26 ¹ / ₄ 667 | 7 ⁵ / ₈ 194 | 14 356 | 2 ¹ / ₄ 57 | 12 ⁵ / ₈ 321 | 19 483 | 20 ¹ / ₂ 521 | 860 390 |

See Page 50 for O.D. Size

MATERIAL SPECIFICATIONS

BODY: Ductile Iron ASTM A 536 Grade 65-45-12

DISC: Bronze ASTM B 584 C-84400

STEM: Stainless Steel ASTM A 582 Type 416

SEAT: High Strength Engineered Resin

SPRING: Stainless Steel ASTM A 302

"O" RINGS: BUNA

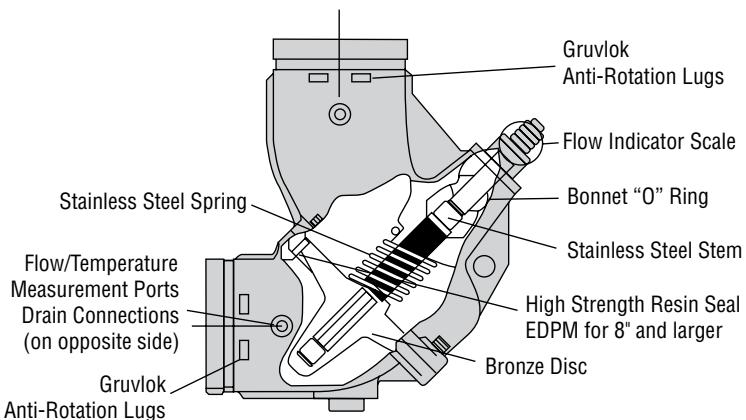
COUPLINGS/FLANGES: Ductile Iron ASTM A 536 Grade 65-45-12 with EPDM² Gaskets (Optional)

INSULATION: Optional¹

NOTE 1: Optional pre-formed insulation is available to meet ASTM D 1784 Class 14253-C, MEA #7-87, ASTM E 136 with a flame spread rating of 25 or less and a smoke development rating of 50 or less.

NOTE 2: EPDM is not suitable for oil service.

NOTE: For temperatures between 230°F and 300°F (110°C and 149°C) specify Viton Elastomers



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Tri-Service Valve

INSTALLATION:

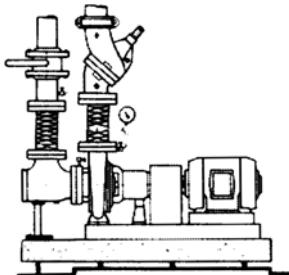
- 1 The valve should be mounted to a spool piece on the discharge side of the pump. Spool piece required is based on a minimum recommended space of 12" for pump sizes 2" x 2" to 6" x 6" and 24" for pump sizes 8" x 8" to 12" x 12".
- 2 It is not recommended to mount a valve directly to the pump as this could cause undesirable noise in the system.
- 3 Sufficient clearance around the valve should be left for valve removal or repair.
- 4 Install valve in the direction of the flow arrows on the valve body.

5 The valve can be mounted to flanged equipment using Gruvlok Flange Adapter or industry standard grooved coupling, suitable for system pressure and temperatures encountered.

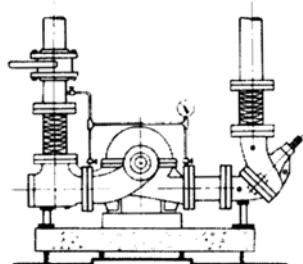
6 The Gruvlok Tri-Service valve bodies have anti-rotation lugs on the inlet and outlet. These lugs, combined with the Flange Adapters, provide a ridged rotation free installation.

7 The valve body has been designed to handle the weight of the pump on vertical in-line installations. The body is not designed to support the piping weight. It is recommended that the piping be supported by hangers. Pipe supports should be provided under the valve and strainer bodies.

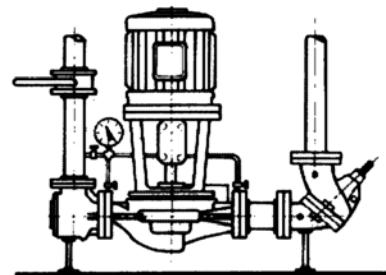
TYPICAL INSTALLATIONS



Base-Mounted Single Suction



Base-Mounted Double Suction



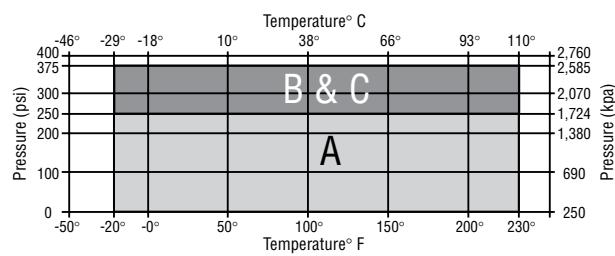
Vertical In-Line

FIELD CONVERSION

(Straight to Angle Pattern Valve)

- 1 Open valve at least one complete turn,
- 2 Remove the body bolts from valve body using Allen Key.
- 3 Rotate one half of the valve body 180° making sure the lower valve seat and "O" Ring stay in position. Inspect the "O" Ring for any cuts or nicks and replace if necessary.
- 4 Replace body bolts and torque evenly to 70 ft./lbs.

PRESSURE – TEMPERATURE LIMITS



| LEGEND | |
|--------|--|
| A | Gruvlok ductile iron flange adapters for ANSI 150# flanges |
| B | Gruvlok ductile iron flange adapters for ANSI 300# flanges |
| C | Grooved end with 375 psi rated pipe coupling |

FLOW MEASUREMENT

Where approximate indication of flow is acceptable the Gruvlok Tri-Service valve can be used.

FLOW MEASUREMENT VALVE IN WIDE OPEN POSITION

Measure and record the differential pressure across the valve using a Flow Meter with high pressure range transducer or pressure gauges with PMP adapters.

Refer to Tri-Service Performance Curves with valve in full open position (See Determining Flow Rate with Valve in Throttled Position Section on page 185). Locate Pressure Differential on left hand side of chart and extend line horizontally across to valve size being used. Drop line vertically down and read flow rate from bottom of chart.

CAUTION:

Safety glasses should be used and the probe should not be left inserted into fittings for prolonged periods of time (overnight, etc.), as leakage from the PMP may occur when probe is removed.

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DETERMINING FLOW RATE WITH VALVE IN THROTTLED POSITION:

1 Record the size of valve and stem position using the Flow Indicator Scale (See Flow Indicator Section at bottom of page). Calculate percentage of valve opening referring to table below:

| VALVE SIZE | 2 1/2 | 3 | 4 | 5 | 6 | 8 | 10 | 12 |
|-----------------------------------|-------|---|---|---|----|----|----|----|
| Number of Rings (valve full open) | 5 | 5 | 6 | 9 | 10 | 12 | 18 | 28 |

2 Measure and record the differential pressure across the valve in the throttled position.

3 Locate percentage of valve opening on the bottom scale of Flow Characteristic Curve. Project line vertically up to intersect with the Valve Characteristic Curve and from this point project line horizontally across to the left of the chart and record the percentage of maximum flow rate.

4 On the Tri-Service Performance Curve locate the differential pressure obtained in Step 2 and project line horizontally across to intercept with Valve Performance Curve. Drop a line vertically down to read the flow rate at the bottom of the chart.

5 To calculate flow rate of valve in the throttled position, multiply the flow rate from Step 4 by the percentage flow rate from Step 2 divided by 100.

Example: Valve size 4 in.

Differential Pressure in 5.4 ft. (1.65 m)

Number of rings open 3, (3 rings / 6 rings X 100) = 50% throttle

Solution:

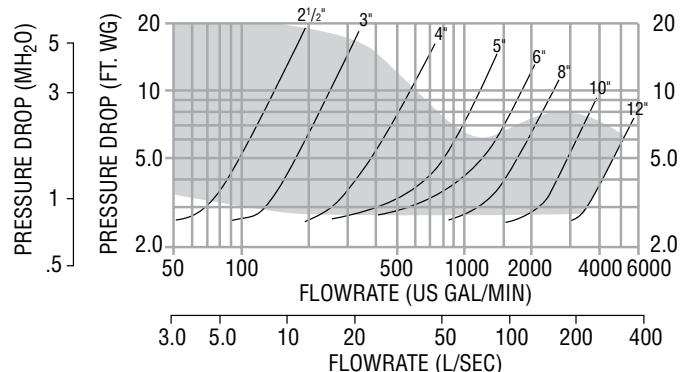
- From the Tri-Service Performance Curve (fig. 5), a 4 in. valve with 5.4 ft. pressure drop (1.65 m) represents a flow of 400 USgpm (25.2 L/s).
- From Flow Characteristic Curve (fig. 6), a 4 in. valve, 50% open, represents 34% of maximum flow.
- Approximate flow of a 4 in. valve, with a 5.4 ft. (1.65 m) pressure drop when 50% throttled is:

$$(400 \times 34)/100 = 136 \text{ USgpm}$$

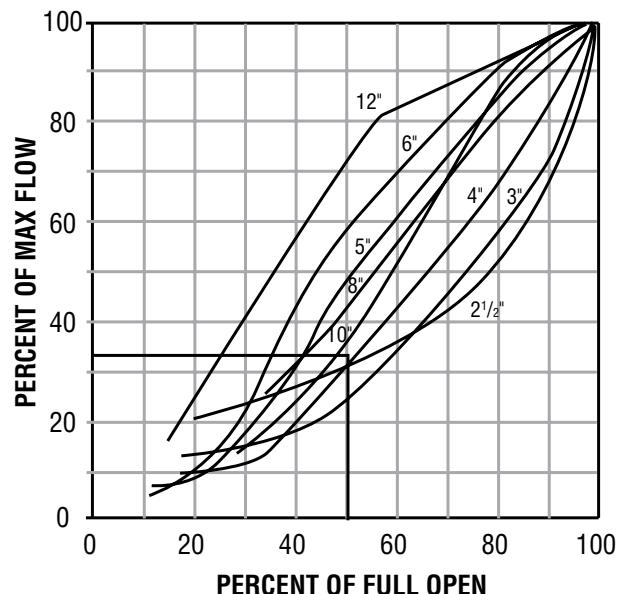
$$(25.2 \times 34)/100 = 8.57 \text{ L/sec.}$$

Note: To prevent premature valve failure it is not recommended that the valve operate in the throttled position with more than 25 ft. pressure differential. Instead the pump impeller should be trimmed or valves located elsewhere in the system to partially throttle the flow.

Tri-Service Performance Curve with Valve in Full Open Position



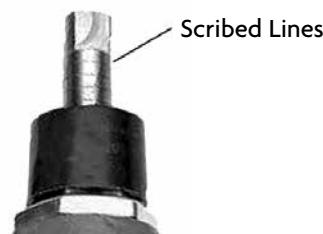
Inherent Flow Characteristic Curve with Valve in Throttled Position



FLOW INDICATOR SCALE

The valve stem with its grooved rings and positioning sleeve indicates the throttled position of the valve. The quarter turn graduations on the sleeve, with the scribed line on the stem, provide for approximate flow measurement.

Note: The valve is shipped in the closed position. The indicator on the plastic sleeve is aligned with the vertical scribed line on the stem.



FTV-S (Straight) & FTV-A (Angle Body)

Tri-Service Valve

OPERATION

To assure tight shut off the valve must be closed using a wrench with 25 to 30 ft./lbs of torque.

To assure trouble-free check valve operation and shut off operation, the valve should be periodically opened and closed to keep valve seat and valve disc guide stem free of build up of system contaminants.

REPACKING OF FTV VALVE UNDER FULL SYSTEM PRESSURE

Should it be necessary, stem "O" Ring can be changed under full system pressure.

CAUTION: Safety glasses should be worn.

- 1** Record the valve setting.
- 2** Turn the valve stem counterclockwise until the valve is fully open and will not turn any further. Torque to a maximum force of 45 ft./lbs. This will ensure good metal-to-metal contact and minimum leakage.
- 3** The valve bonnet may now be removed. There may be a slight leakage, as the metal-to-metal backseating does not provide a drip-tight seal.
- 4** Clean exposed portion of valve stem (Do not scratch).
- 5** Remove and replace the "O" Ring and gasket.
- 6** Install the valve bonnet.
- 7** Tightening valve bonnet is necessary to stop any leaks.
- 8** Open valve to balance set point as recorded in Step 1.

MAXIMUM NUMBER OF TURNS FULL OPEN VALVE

On valve sizes 2 $\frac{1}{2}$ " and 3", full open position of valve is 5 turns. However, valve will open to 5 $\frac{1}{2}$ turns which is just back of seating of valve.

SEAT REPLACEMENT

- 1** Drain system and remove valve from piping.
- 2** Remove the body bolts from the body using an Allen Key.
- 3** Remove seat and "O" Ring. "O" Ring is not used on valves 8" and larger.
- 4** Clean exposed portion of valve stem (Do not scratch).
- 5** Remove and replace the "O" Ring and gasket.
- 6** Inspect and clean "O" Ring cavity and install new "O" Ring and seat. Valve disc stem also should be inspected and replaced if worn. Valve stem "O" Ring should be replaced at this time.