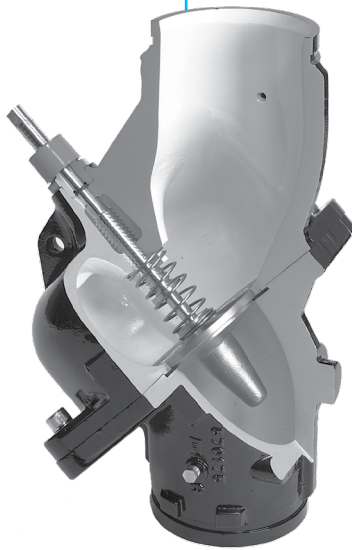


## Tri-Service Valve Fig. FTV-S (Straight) & FTV-A (Angle Body)



### Features & Benefits

- Three functions, one valve –
  1. Spring-closure design,
  2. Non-slam check valve,
  3. Flow throttling valve
- Reduced field installation and material cost
- Stainless steel spring
- High-strength resin seat EPDM for 8" and larger
- Anti-rotation lugs on the inlet and outlet. These lugs, combined with the Gruvlok 7401 Rigidlok Coupling or the Gruvlok flange adapter provides for a ridged rotation free installation
- Flow measurement and pump throttling capabilities
- Temperature measurement capability
- Spring-closure design check valve prevents gravity or reverse circulation when pump is not operating
- Bonnet "O" Ring can be replaced under full system pressure by back seating of valve stem
- Suitable for maximum working pressure to 375 psi (26 bar) and temperatures to 230°F. (110°C)
- Valve seat can be changed in the field without use of special tools
- Low pressure drop due to "Y" pattern valve design
- Valve Cv designed to ASHRAE flow recommendations for quiet system operation
- Drip-tight shut off valve smoke development rating of 50 or less

### 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 ¼ 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

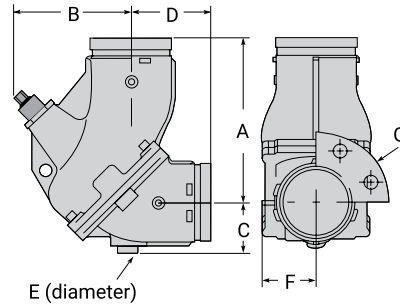
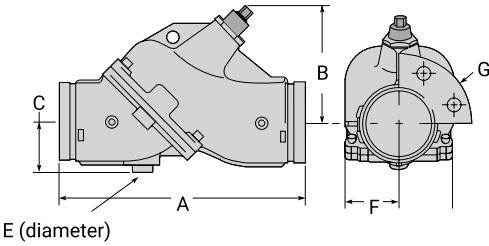
The unique convertible body design permits the valve to be changed on site from the straight to the angle configuration. Flow measurement (where an approximate indication is acceptable) is obtained by flow measuring ports on each side of the valve seat. Pressure differential is easily recorded using 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.**



PROJECT INFORMATION	APPROVAL STAMP
Project:	Approved
Address:	Approved as noted
Contractor:	Not approved
Engineer:	Remarks:
Submittal Date:	
Notes 1:	
Notes 2:	

## Tri-Service Valve Fig. FTV-S (Straight) & FTV-A (Angle Body)



### 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	Lbs./Kg
2½ 65	12 305	7 178	2¾ 70	1 25	2⅞ 65	7 178	7½ 191	19 9
3 80	12 305	7⅞ 198	2⅞ 62	1 25	3 80	7½ 191	8¼ 210	24 11
4 100	14 356	8 203	3 80	1¼ 32	3⅞ 87	9¼ 235	10 254	42 19
5 125	17½ 445	10⅞ 257	3⅞ 92	1¼ 32	4⅞ 125	10 254	11 279	81 37
6 150	20⅞ 525	10⅞ 264	4⅞ 113	2 51	5⅞ 149	11 279	12½ 318	120 54
8 200	28⅞ 716	22⅞ 579	5⅞ 144	2¼ 57	7⅞ 200	13½ 343	15 381	300 136
10 250	30 762	28⅞ 727	6⅞ 167	2¼ 57	9⅞ 241	16 409	17½ 445	450 204
12 300	38⅞ 967	32⅞ 829	7⅞ 194	2¼ 57	12⅞ 321	19 483	20½ 521	850 390

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 EPDM<sup>2</sup> Gaskets (Optional)

**Insulation:** Optional<sup>1</sup>

**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.

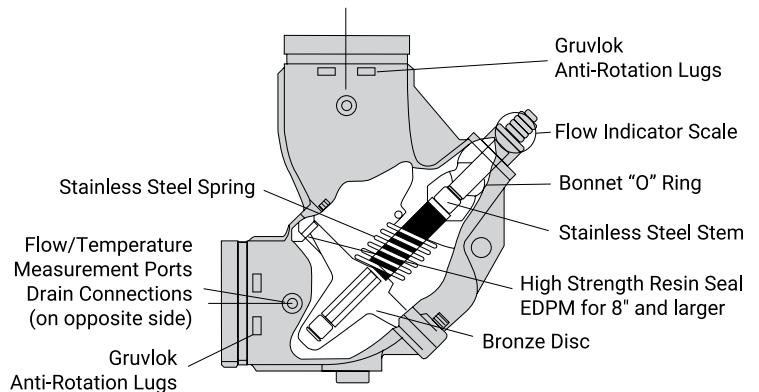
**Note 2:** EPDM is not suitable for oil service.

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

### 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	Lbs./Kg
2½ 65	7⅞ 187	7 178	2¾ 70	4⅞ 117	1 25	2⅞ 65	7 178	7½ 191	19 9
3 80	8⅞ 208	7⅞ 198	2⅞ 62	3⅞ 98	1 25	3 80	7½ 191	8¼ 210	24 11
4 100	9⅞ 244	8 203	3 80	4⅞ 111	1¼ 32	3⅞ 87	9¼ 235	10 254	42 19
5 125	12 305	10⅞ 257	3⅞ 92	5½ 140	1¼ 32	8⅞ 125	10 254	11 279	81 37
6 150	14⅞ 359	10⅞ 264	4⅞ 113	6⅞ 168	2 51	5⅞ 149	11 279	12½ 318	120 54
8 200	18⅞ 481	18¾ 476	5⅞ 144	9⅞ 233	2¼ 57	7⅞ 200	13½ 343	15 381	300 136
10 250	20⅞ 516	24 610	6⅞ 167	9¾ 248	2¼ 57	9⅞ 241	16 409	17½ 445	450 204
12 300	24⅞ 611	26¼ 667	7⅞ 194	14 356	2¼ 57	12⅞ 321	19 483	20½ 521	860 390

See Page 50 for O.D. Size



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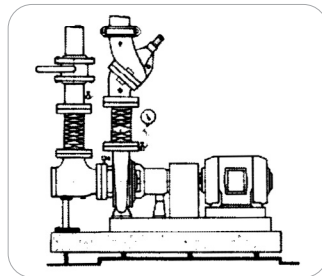
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## Tri-Service Valve Fig. FTV-S (Straight) & FTV-A (Angle Body)

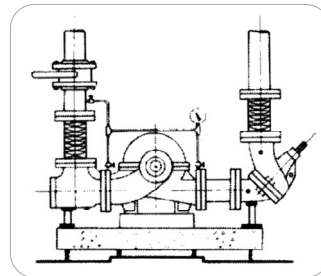
### Installation

- 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 rigid 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.

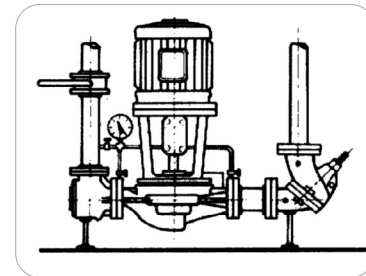
### Typical Installations



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.

### Flow Measurement

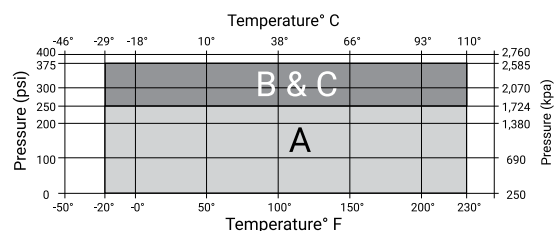
Where approximate indication of flow is acceptable the Gruvlok Tri-Service valve can be used.

#### 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.

### Pressure – Temperature Limits



Note: for temperatures between 230°F and 300°F (110°C and 149°C) specify Viton Elastomers.

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

### 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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## Tri-Service Valve Fig. FTV-S (Straight) & FTV-A (Angle Body)

### Determining Flow Rate With Valve In Throttled Position

- 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	2½	3	4	5	6	8	10	12
Number of Rings (valve full open)	5	5	6	9	10	12	18	28

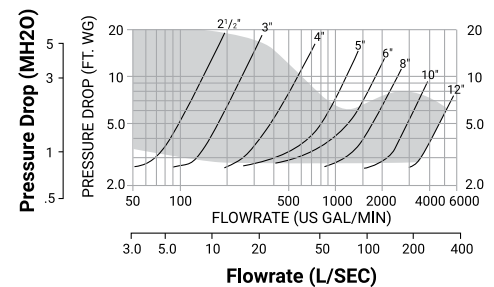
- Measure and record the differential pressure across the valve in the throttled position.
- Locate percentage of valve opening on the bottom scale of Flow Characteristic Curve. Project line vertically up to intersect with the Valve Characteristic Curve and from this point project line horizontally across to the left of the chart and record the percentage of maximum low rate.
- 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.
- 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

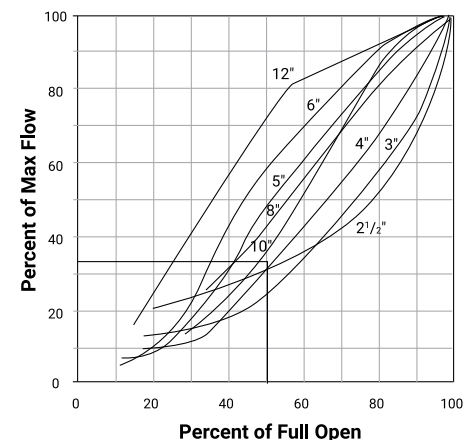
**Solution:**

- 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 x 34)/100 = 136 USgpm  
(25.2 x 34)/100 = 8.57 L/sec.

Tri-Service Performance Curve with Valve in Full Open Position



Inherent Flow Characteristic Curve with Valve in Throttled Position



**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

### 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.



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## Tri-Service Valve Fig. FTV-S (Straight) & FTV-A (Angle Body)

### 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 2½" and 3", full open position of valve is 5 turns. However, valve will open to 5½ 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.



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