



## TRI-SERVICE VALVE

FTV-A Angle Pattern • FTV-S Straight Pattern



**ANVIL**<sup>TM</sup>  
INTERNATIONAL, INC.

[www.anvilintl.com](http://www.anvilintl.com)

value

## Engineered

Gruvlok® FTV-A and FTV-S Valves are designed for installation on the discharge side of centrifugal pumps. This results in savings in space, as well as installation and material costs.

The Gruvlok® FTV Tri-Service Valve incorporates three functions in one valve:

- Drip-tight shutoff valve
- Spring-closure design, non-slam check valve
- Flow throttling valve

Flow/Temperature Measurement Port

Flow Indicator Scale

Bonnet "O" Ring

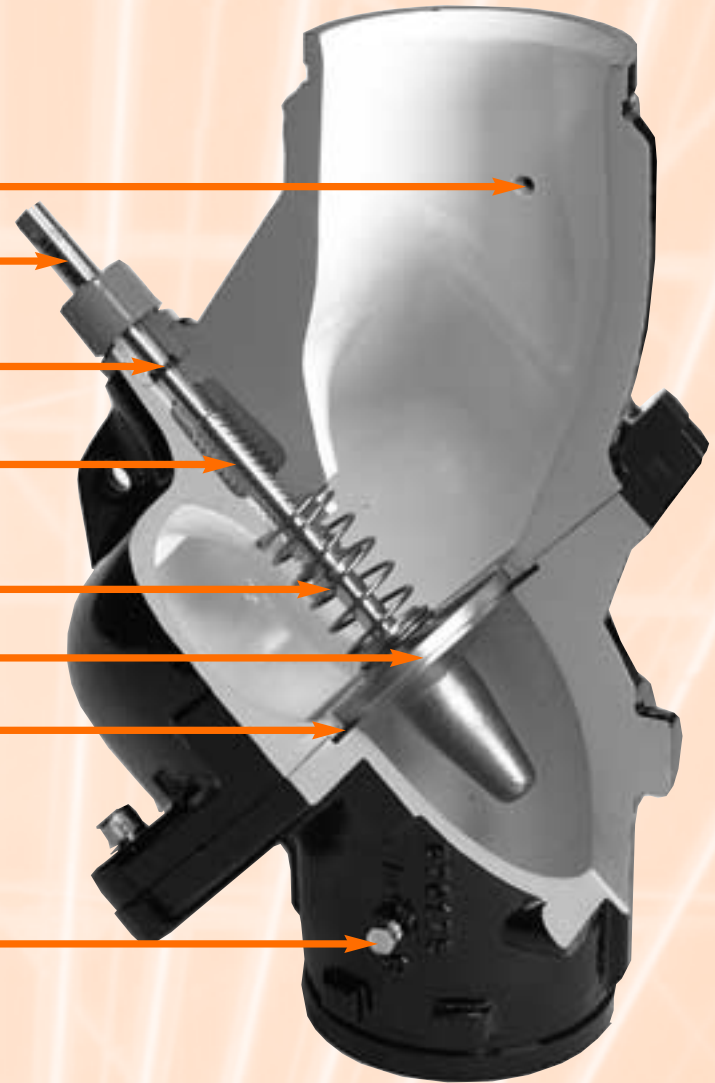
Stainless Steel Stem

Stainless Steel Spring

Bronze Disc

Resilient Seat

Drain

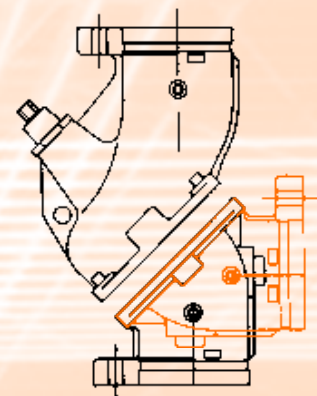


innovative

## 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.





## SIZES (2<sup>1</sup>/<sub>2</sub>" - 12")

Furnish and install on the discharge side of each pump a Gruvlok® FTV Tri-Service (Combination Valve) incorporating three functions in one body: tight shut-off, spring-closure type silent non-slam check and flow measurement/throttling.

Valve body shall be ductile iron with grooved ends. The body shall have two 1/4" NPT connections on each side of the valve seat. Two connections to have brass pressure and temperature metering ports, with Nordel check valves and gasketed caps. Two other connections to be supplied with brass drain plugs. Metering ports are to be interchangeable with drain ports to allow for measurement flexibility when installed in tight locations.

The valve disc shall be bronze plug disc type with high impact engineered resin seat to ensure tight shut-off and silent check valve operation.

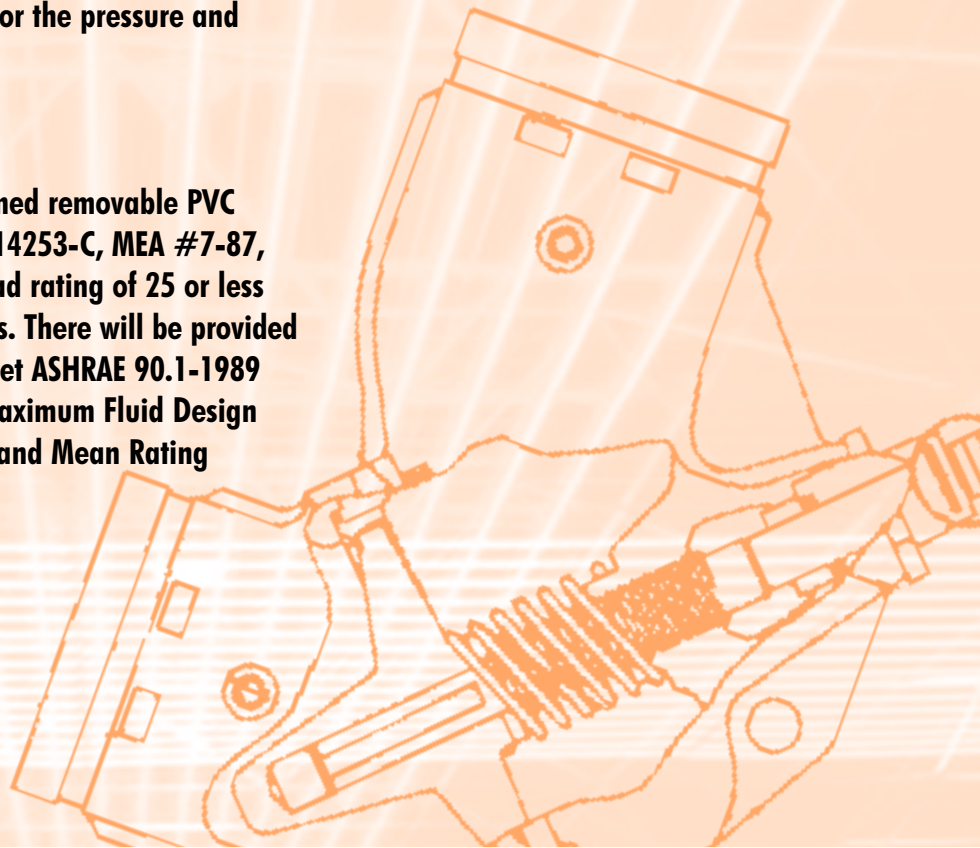
The valve stem shall be stainless steel with flat surfaces provided for adjustment with open end wrench.

Flange adapters, where necessary, are to be Gruvlok 7012 or 7013 ductile iron flanges with EPDM gaskets.

The valve shall be selected and installed in accordance with the manufacturer's instructions and be suitable for the pressure and temperature encountered.

## Insulation (2<sup>1</sup>/<sub>2</sub>" - 6")

Each valve shall be furnished with a pre-formed removable PVC insulation jacket to meet ASTM D1784/class 14253-C, MEA #7-87, ASTM-E-84 and ASTM-136 with a flame spread rating of 25 or less and a smoke development rating of 50 or less. There will be provided sufficient mineral fiberglass insulation to meet ASHRAE 90.1-1989 specifications in operating conditions with maximum Fluid Design Operating Temperature Range of 141-200°F and Mean Rating Temperature of 125°F.

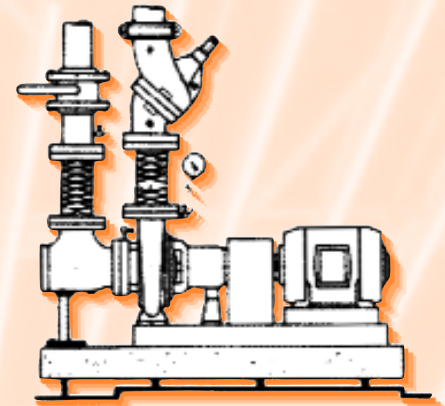
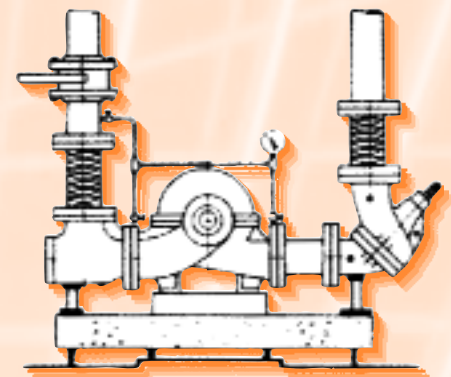
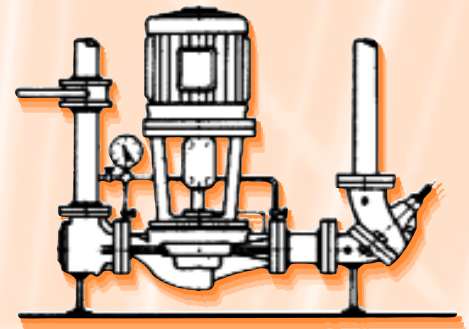


# Design

## benefits

- Reduced field installation and material cost
- Ductile iron valve body with standard grooved ends
- Eliminates requirement of three valves on pump discharge and, in some cases , a 90° elbow, thus saving space
- Soft seat to ensure tight shut-off
- Spring-closure design, non-slam silent check valve feature for vertical or horizontal mounting
- 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 (2586 kPa) 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.

### TYPICAL INSTALLATIONS



## Flow indicator

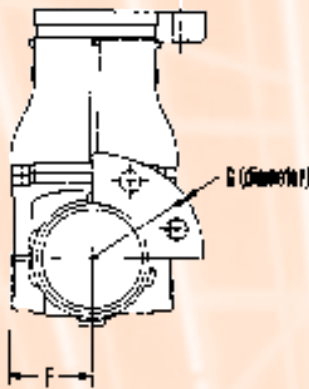
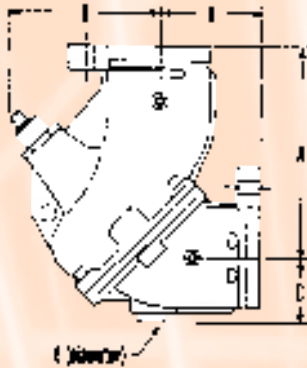
## Scale

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.

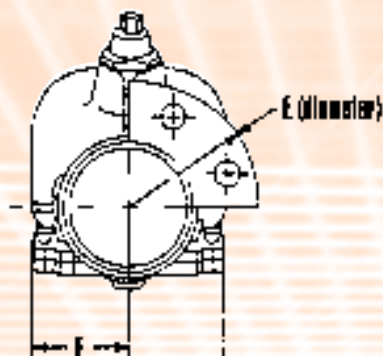
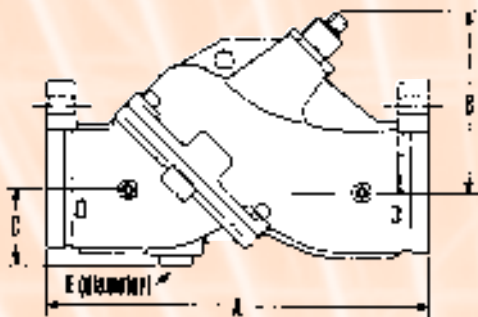


# Dimensions and materials of construction

## MODEL FTV-A



## MODEL FTV-S



## Model FTV-A (ANGLE)

Connection Size	A	B (fully open)	C	D	E	F	Flange	Flange	Weight
							125/150 PSI	250/300 PSI	
							G	G	
inches	in/mm	in/mm	in/mm	in/mm	in/mm	in/mm	in/mm	in/mm	lbs/kg
2 1/2	7 3/8 (187)	7 (178)	2 3/4 (70)	4 5/8 (117)	1 (25)	2 1/16 (65)	7 (178)	7 1/2 (191)	19 (9)
3	8 7/16 (208)	7 13/16 (198)	2 7/16 (62)	3 7/8 (98)	1 (25)	3 (76)	7 1/2 (191)	8 1/4 (210)	24 (11)
4	9 5/8 (244)	8 (203)	3 (76)	4 5/8 (111)	1 1/4 (32)	3 7/16 (87)	9 1/4 (235)	10 (254)	42 (19)
5	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	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	18 15/16 (481)	18 3/4 (476)	5 1/16 (144)	9 3/16 (233)	2 1/4 (57)	7 7/8 (200)	13 1/2 (343)	15 (381)	300 (136)
10	20 7/16 (516)	24 (610)	6 1/16 (167)	9 1/4 (248)	2 1/4 (57)	9 15/32 (241)	16 (409)	17 1/2 (445)	450 (204)
12	24 7/16 (611)	26 1/4 (667)	7 7/8 (194)	14 (356)	2 1/4 (57)	12 5/8 (321)	19 (483)	20 1/2 (521)	860 (390)

## Model FTV-S (STRAIGHT)

Connection Size	A	B (fully open)	C	D	E	F	Flange	Flange	Weight
							125/150 PSI	250/300 PSI	
							G	G	
inches	in/mm	in/mm	in/mm	in/mm	in/mm	in/mm	in/mm	in/mm	lbs/kg
2 1/2	12 (305)	7 (178)	2 3/4 (70)	-	1 (25)	2 1/16 (65)	7 (178)	7 1/2 (191)	19 (9)
3	12 (305)	7 13/16 (198)	2 7/16 (62)	-	1 (25)	3 (76)	7 1/2 (191)	8 1/4 (210)	24 (11)
4	14 (356)	8 (203)	3 (76)	-	1 1/4 (32)	3 7/16 (87)	9 1/4 (235)	10 (254)	42 (19)
5	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	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	28 3/16 (716)	22 3/16 (579)	5 1/16 (144)	-	2 1/4 (57)	7 7/8 (200)	13 1/2 (343)	15 (381)	300 (136)
10	30 (762)	28 5/8 (727)	6 1/16 (167)	-	2 1/4 (57)	9 15/32 (241)	16 (409)	17 1/2 (445)	450 (204)
12	38 7/16 (967)	32 5/8 (829)	7 7/8 (194)	-	2 1/4 (57)	12 5/8 (321)	19 (483)	20 1/2 (521)	850 (390)

## MATERIAL SPECIFICATIONS

- Body:** Ductile Iron ASTM A536 GR 65-45-12
- Disc:** Bronze ASTM B584 C-84400
- Seat:** High Strength Engineered Resin
- Stem:** Stainless Steel ASTM A582 Type 416
- Spring:** Stainless Steel ASTM A302
- "O" Rings:** BUNA
- Flanges:** Ductile Iron ASTM A536 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 D1784 Class 14253-C, MEA #7-87, ASTM E84 and ASTM E136 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 all service.

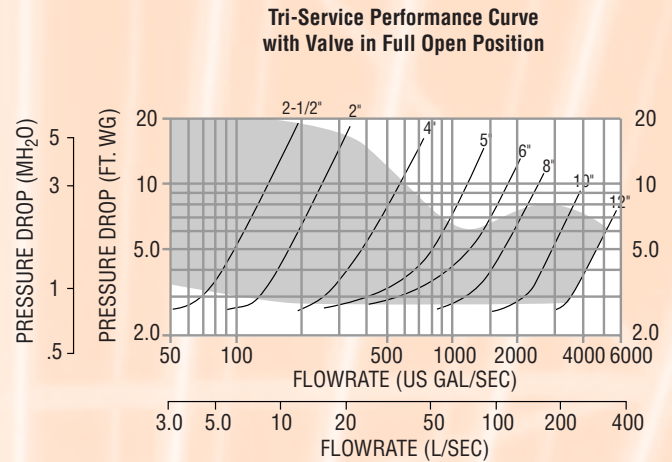
**Note:** For temperatures between 230°F and 300°F (110°C and 149°C) specify Viton Elastomers.



# performance Curves valve in full open position

## VALVE SELECTION CRITERIA

1. **Minimum Flow Rate** – To ensure sufficient flow to hold disc in full open position during operation, size valves in shaded area only of Performance Curve.
2. **Maximum Flow Rate** – Select valve in shaded area only. However, consideration should be given to selecting the valve with the lowest pressure drop and velocity in accordance with ASHRAE practice. This will ensure a quiet, energy-efficient system and maximum valve life.



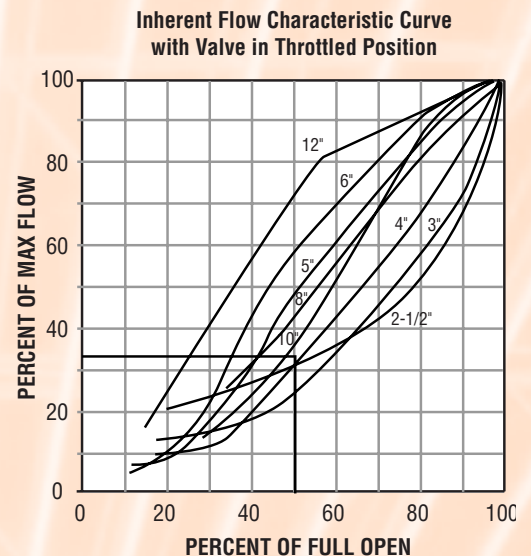
# inherent flow Characteristic curves valve in throttled position

## DETERMINING FLOW RATE

1. Record the size of valve and stem position using the Flow Indicator Scale. 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

2. Measure and record the differential pressure across the valve in the throttled position.
3. Locate percentage of valve opening on the bottom 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 4 by the percentage flow rate from Step 2 divided by 100.



### Example:

Valve size 4 in.

Differential Pressure in 5.4 ft. (1.65m)•

Number of rings open 3, (3 rings / 6 rings x 100) = 50% throttled

### Solution:

- From the Tri-service performance Curve, a 4 in. valve with 5.4 ft. pressure drop (1.65m.) represents a flow of 400 USgpm (25.2 l/s).
- From Flow Characteristic , a 4 in. valve, 50% open, represents 34% of maximum flow.
- Approximate flow of a 4 in. valve, with a 5.4 ft. (1.65m) 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.



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