

# Watts Series TDV

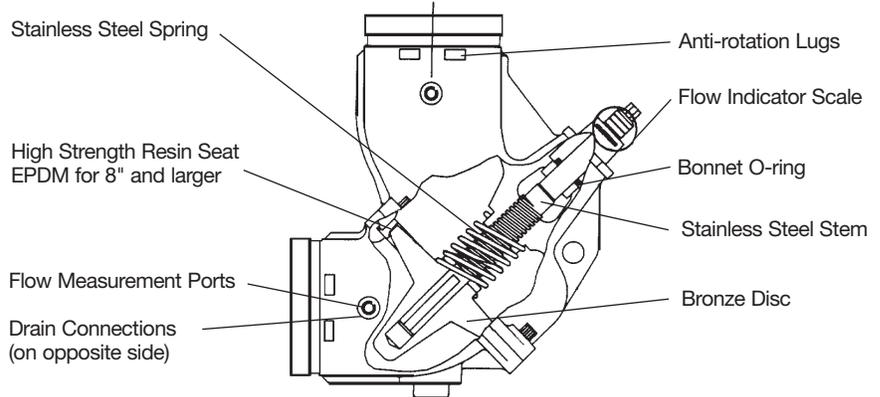
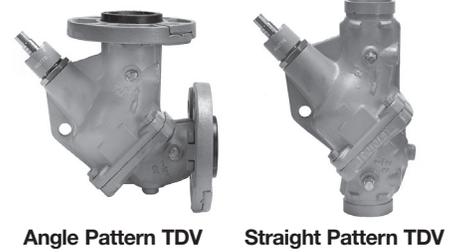
## Triple Duty Combination Valves

Sizes: 2" x 2" to 12" x 12" (50 x 50mm to 300 x 300mm)

### Installation and Operating Instructions

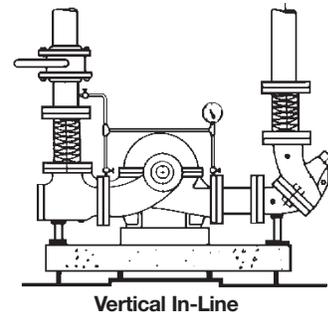
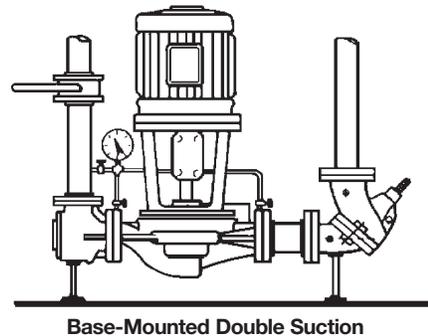
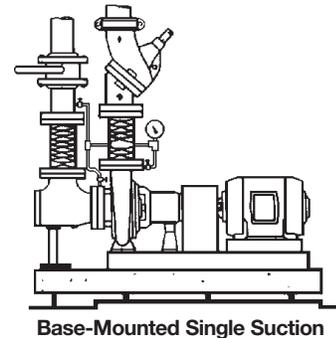
The Watts Series TDV Combination Valves are designed for installation on the discharge side of centrifugal pumps. The Watts Combination Valve incorporates three functions in one valve:

- Drip-tight, shutoff valve
- Spring closure design, Non-slam check valve
- Flow throttling 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 Watts Flange Adapters or industry standard grooved coupling, suitable for system pressure and temperatures encountered.
6. The Watts Series TDV valve bodies have anti-rotation lugs on the inlet and outlet. These lugs, combined with the Watts 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.



## Watts Flange Adapter Installation

1. Position the two halves of Watts Flange Adapter on the valve body (Fig. 1) ensuring that the lugs on each half of the flange adapters are located between the anti-rotation lugs on the valve body. Insert two bolts of specified size (Table 1) to secure the halves of the flange adapter to the valve body (Fig. 2). The gasket cavity should face out to the adjoining flange.
2. Lubricate the inner and outer diameter of the gasket with the lubricant provided or a similar **non-petroleum** base water soluble grease.
3. Press the gasket firmly into the flange cavity ensuring that the sealing lip is pointed outward. When in place, the gasket should not extend beyond the end of the pipe (Fig. 3).
4. Position the adjoining flange or the pipe to the Watts Flange Adapter and install the remaining bolts. The two locking bolts should be tightened first in order to position the flanges correctly as shown in Fig. 1.

**NOTE:** Care should be taken to ensure that the gasket is not pinched or bent between flanges.

5. Tighten remaining nuts evenly, following bolting instructions (Fig. 4), so that the flange faces remain parallel. Flange bolts should be tightened to 70 ft./lbs. torque minimum to assure firm metal-to-metal contact. When raised face flanges are used, there will be a gap between the faces of the outer diameter.
6. Flange gaskets are not interchangeable with other mechanical pipe couplings or flange gaskets.

**Watts  
Flange Adapter Details  
125 psi/150 psi  
Ductile Iron**

Valve		Bolt	
Size	No.	Size	
2½	4	5/8	
3	4	5/8	
4	8	5/8	
5	8	¾	
6	8	¾	
8	8	¾	
10	12	7/8	
12	12	7/8	

Table 1

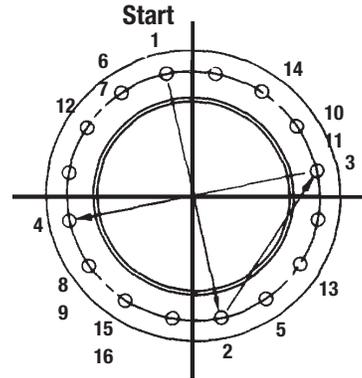


Fig. 4

Recommended Bolt Tightening Procedure

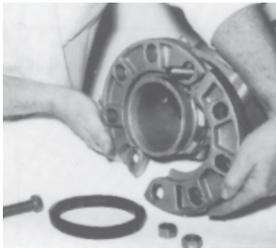


Fig. 1



Fig. 2

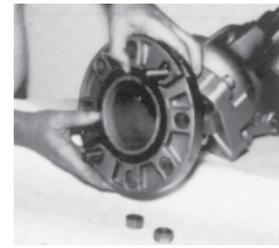
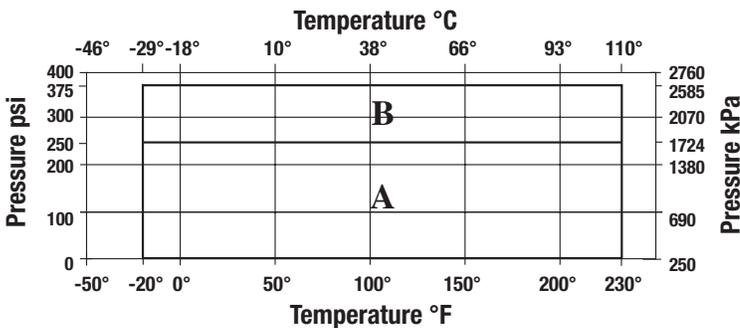


Fig. 3

## Pressure - Temperature Limits



Legend	
<b>A</b>	Watts Ductile iron flange adapters for ANSI 150# flanges
<b>B</b>	Grooved end with 375 psi rated pipe coupling

## 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.

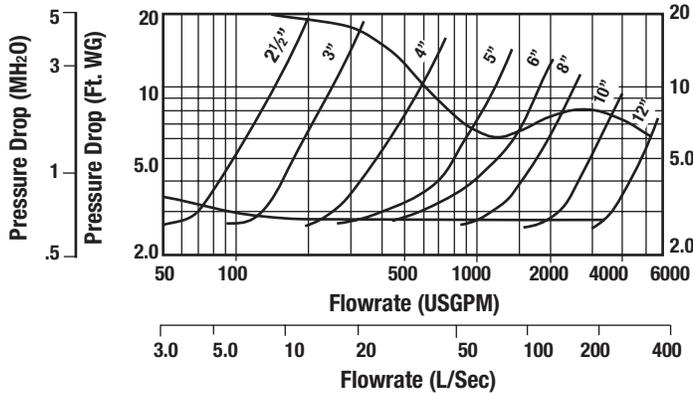
## Flow Indicator Scale

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.

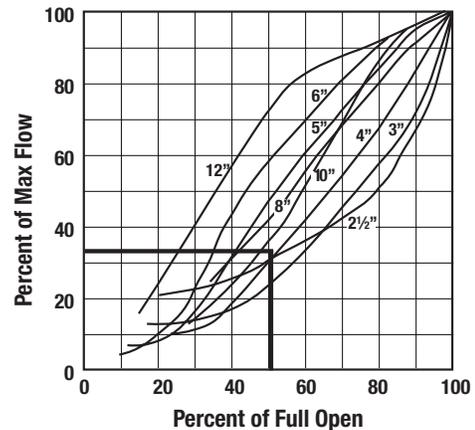


Fig. 5



Series TDV Performance Curve with Valve in Full Open Position

Fig. 6



Inherent Flow Characteristic Curve with Valve in Throttled Position

## Flow Measurement

1. Where approximate indication of flow is acceptable the Watts Series TDV valve can be used.

### 2. Flow Measurement Valve in Wide Open Position

1. Measure and record the differential pressure across the valve using a Watts Series PG meter.

**CAUTION:** Safety glasses should be used.

2. Refer to Series TDV Performance Curves with valve in full open position (Fig. 5).

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.

### 3. Determining Flow Rate with Valve in Throttled Position

1. Record the size of valve and stem position using the Flow Indicator Scale (on page 3) 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 scale of Flow Characteristic Curve (Fig. 6). 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 Series TDV Performance Curve (Fig. 5) locate the differential pressure obtained in Step 6.3.2 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 6.3.4 by the percentage flow rate from Step 6.3.2 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**

- From the Performance Curve (Fig. 5), 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 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. (1.65m) pressure drop when 50% throttled is:

$$\frac{400 \times 34}{100} = 136 \text{ USgpm} \quad \frac{25.2 \times 34}{100} = 8.57 \text{ l/s}$$

**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.

## Operation

1. To assure tight shut off the valve must be closed using a wrench with 25 to 30 ft./lbs. of torque.
2. 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 Series TDV Valve Under Full System Pressure

1. Should it be necessary, stem O-ring can be changed under full system pressure. CAUTION: Safety glasses should be worn.
2. Record the valve setting.
3. 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.
4. 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.
5. Clean exposed portion of valve stem (Do not scratch).
6. Remove and replace the O-ring and gasket.
7. Install the valve bonnet.
8. Tightening valve bonnet is necessary to stop any leaks.
9. Open valve to balance set point as recorded in 8.2.

## Maximum Number of Turns Full Open Valve

**NOTE:** 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. 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. Refer to Section 8.

### CALIFORNIA PROPOSITION 65 WARNING

**WARNING:** This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. (California law requires this warning to be given to customers in the State of California.)

For more information: [www.watts.com/prop65](http://www.watts.com/prop65)

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