

Tilting Disc Check Valves: Top Dashpot Configuration

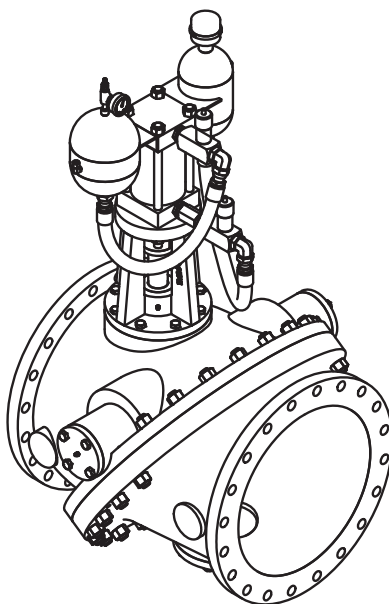


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VALVE INTRODUCTION

The hallmark of the Crispin Tilting Disc Check Valve is its superior design and function. Its concept provides the most efficient and solid approach to flow reversal. The characteristics of the design produce a head loss lower than that of most any other check valve made. The main idea behind the “Tilting Disc” Check Valve is its 55 degree slanted seat position. Unique to the “TD” design, this seat positioning provides extremely high efficiency and operability.

VALVE INSTALLATION

Valves are to be handled by experienced handlers. They should never be used as structural members and should be appropriately rigged for lifting. Valves are heavy and include various accessories, which should be handled with caution. Tools and equipment for installation should include standard box wrenches, pin drivers, a ball peen hammer, rigging equipment and a chain hoist.

The TD Series can be installed in both Horizontal and Vertical applications. However, **for horizontal valve installations, the centerline of the disc shaft trunnions must be parallel to the horizontal centerline of the valve unit.** Valves must be installed with the cast Flow Arrow on the body pointing in the direction of the water flow. An appropriate gasket should be used between the flat-faced valve flanges and the connecting pipe flanges to achieve a firm seal. Standard industry practice of cross tightening bolts in stages should be applied. Caution should be used during installation to avoid damage to piping and valve unit. Support of valve unit and connecting piping is necessary.

VALVE OPERATION

The Crispin Tilting Disc Valve accomplishes full flow opening by having the disc pivot or “tilt” in the flow of the media. Swing check valves move the disc out of the flow by displacing the seat disc to the upper portion of the valve. By pivoting the disc in the flow, the opening stroke range of the Tilting Disc Valve is far less than that of other valves, reducing the opening and closing times critical to controlling flow reversal and reducing water hammer.

The seating surfaces of the seat ring and disc are machined to an angle of approximately 20 degrees, providing more clearance right up to closing while reducing seat wear and improving sealing properties.

The key to the valve’s efficiency is it’s “in the flow pivot.” When the velocity is sufficient to open the valve, the pivot pin clearance allows the valve to un-seat without sticking. Once open, the teardrop like design of the disc keeps it stable and un-fluttering in the flow. Meanwhile, full opening is achieved through only 40% stroke from the seated position.

The seat disc opens and closes the valve by pivoting on two fixed pivot shafts attached to the disc from either side of the body. Replaceable pivot bushings of a different material hardness in the disc are the actual pivot points, and are located almost 1/3 of the way down the disc, leaving 2/3 of the disc weight below. The resulting counter balance effect closes the valve quickly yet limits slamming.

Since the “tilting” of the disc on a 1/3, 2/3 split puts part of the disc through the seating area, there must be a small clearance around the pivot bushing and pivot shaft. The top of the disc seats from the opposite direction as the bottom. The built in clearance allows the disc to “float” into place at final seating.



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VALVE DISASSEMBLY (See drawing on pg 4)

1. Place the valve unit face down on its inlet flange.
2. Remove the 2 locating dowel pins (28) and the center body flange bolting (24 and 25). Note that the nut (25) is removed from the stud (23). The stud (23) remains in the body.
3. Remove the external indicator pointer (19) and indicator plate (21).
4. Remove the pivot pins (10 and 11).
5. Using a hoist or lift, raise the outlet section of the body (1) and remove the bearing caps (14 and 15). When separating the body halves, be careful not to destroy the flange o-ring (7).
6. Remove the pivot pin bushings (8 and 9) from the tilting disc (5).

VALVE REASSEMBLY (See drawing on pg 4)

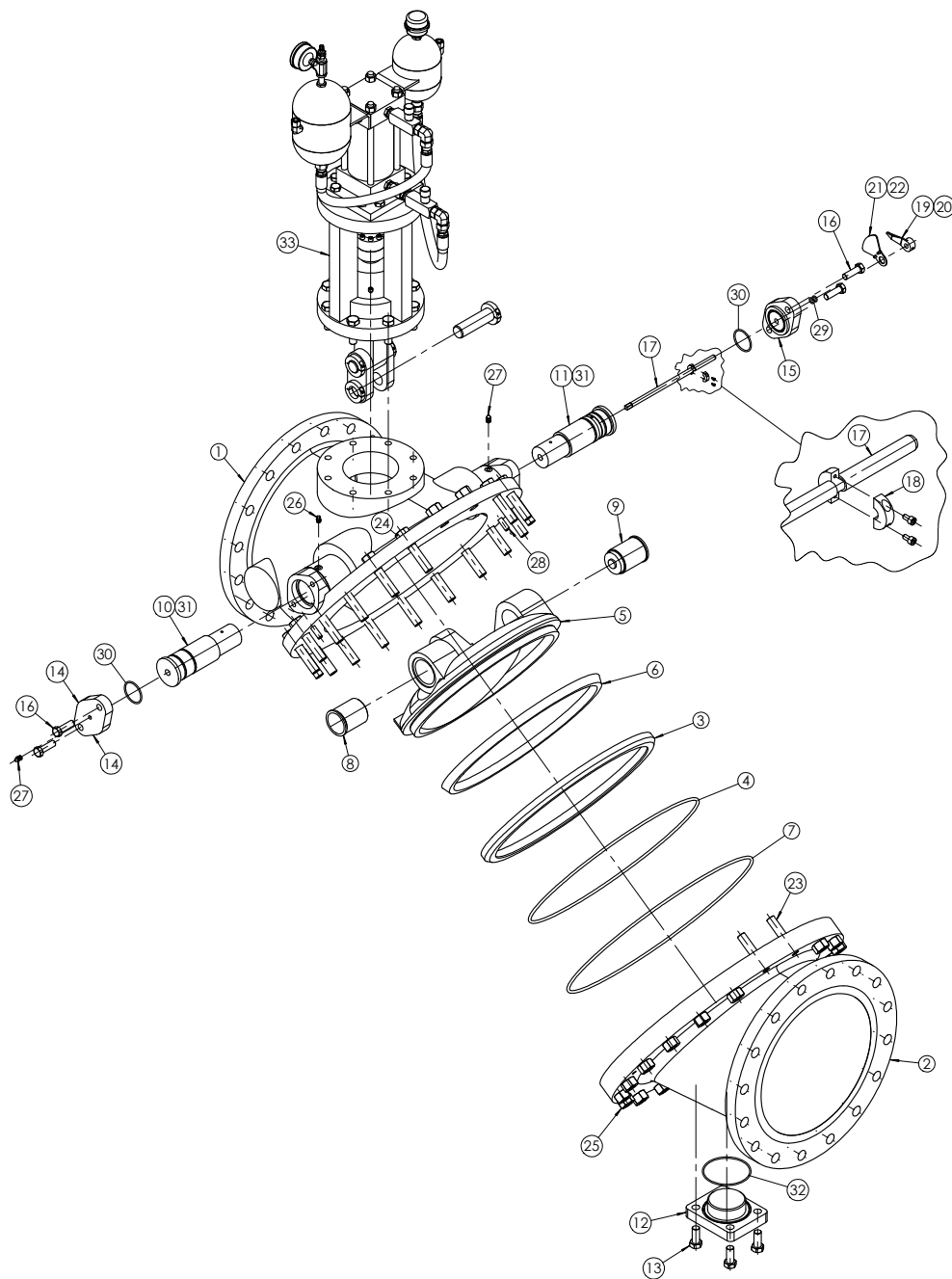
When reassembling gasketed areas, a small amount of lubricant should be applied to the gaskets.

1. Place the body seat o-ring (4) in the inlet body (2).
2. Install the body seat ring (3) with the beveled edge facing out and the flat edge against the body seat o-ring (4).
3. Re-assemble the disc ring (6), with the beveled edge facing out. Thread the disc ring (6) onto the tilting disc (5) using the appropriate thread sealant. (Please note that tilting disc valves sizes 12" and larger are threaded. On tilting disc valves sizes 3-10", the disc ring is integral with the tilting disc (5). Cross tighten the center flange bolting (23, 24 and 25) evenly. The use of a stud locking compound is recommended.
4. Using the dashpot connection eye on the tilting disc (5), hoist the disc into the inlet body (2). Be careful not to score the seating surface.
5. With the tilting disc (5) in place, center the disc's pivot trunnions so they are at equal distance from the diagonal flange locating dowel pin holes (28), and the disc ring (6) is parallel to the body seat ring (3).
6. Install the pivot pin bushings (8 and 9) into the tilting disc (5).
7. Place the flange o-ring (7) onto the diagonal body flange.
8. Install the locating dowel pins (28) into the inlet body (2) half's diagonal flange. Hoist the outlet body (1) half over the inlet body (2) half and lower the outlet body half's diagonal flange. Carefully align the alignment holes with the locating dowel pins (28) and gently lower the outlet body (1) onto the inlet body (2) half.
9. Install the center flange bolting (24 and 25). Standard industry practice of cross tightening bolts in stages should be applied.
10. Install the solid pivot pins (10 and 11) in the body (1 and 2)/tilting disc (5).
11. Install the indicator shaft o-ring (29) in the indicator rod (17). Apply food-grade waterproof grease to the seals. Install the pivot pin cover o-rings (30) and end bearing caps (14 and 15).
12. Install the external indicator pointer (19) and indicator plate (21). The pointer should point toward the letter "S" cast on the indicator plate (21).
13. Install the hand hole o-ring (32) and hand hole cover (12) with hex head bolts (13).
14. Apply grease to the pivot pins (10 and 11) through the grease fittings prior to operation.
15. It is best to actuate the valve several times prior to operation in the system. This can be done through the top inspection port with the use of a hoist attached to the disc.



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Main Valve Parts List

ITEM	DESCRIPTION
1	OUTLET BODY
2	INLET BODY
3	BODY SEAT RING
4	BODY SEAT O-RING
5	TILTING DISC
6	DISC RING
7	FLANGE O-RING
8	PP DISC BUSHING
9	PP BUSHING/ DRIVE PLATE
10	PIVOT PIN
11	PIVOT PIN/IND. SIDE
12	HAND HOLE COVER
13	HEX HEAD BOLT
14	END BEARING CAP
15	END BEARING CAP/ INDICATOR SIDE
16	HEX HEAD BOLT
17	INDICATOR ROD
18	SHAFT COLLAR
19	INDICATOR POINTER
20	POINTER SET SCREW
21	INDICATOR PLATE
22	PHILLIPS RND HD SCREW
23	STUD
24	HEX HEAD BOLT
25	HEX HEAD NUT
26	PIPE PLUG
27	GREASE FITTING
28	LOCATING DOWEL PIN
29	IND. SHAFT O-RING
30	PIVOT PIN O-RING
31	O-RING SIZE
32	HAND HOLE O-RING
33	TOP MOUNTED DASHPOT



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VALVE MAINTENANCE

The Crispin TD Series Tilting Disc Check Valve is manufactured with ease of field maintenance in mind. The seat is replaceable in the field without the need for special tools or equipment, thus reducing valve down time. This is very rarely necessary. Should it be required, the pressure in the valve should be relieved prior to internal inspection or disassembly. All TD Series valves are provided with grease fittings on both shaft trunnions. Periodic greasing of the unit is required based on the frequency of its usage in the application. Use a food grade waterproof grease.

VALVE SERVICE

If repair parts are needed, please furnish the Crispin serial number from the equipment so that we are able to send the proper items. Parts and service are available from your local representative or distributor. Make note of the valve size and model number located on the valve tag.

VALVE STORAGE RECOMMENDATIONS

All valves should be inspected at time of delivery for shipping damage and to confirm compliance with specifications. Whenever possible, the valves and all apparatus should be protected from the weather. Water and debris should not collect in the valve. Please note that these instructions are guidelines for use by experienced piping and mechanical personnel.

Valves should be stored in a clean, dry, cool location. Valves should not be exposed to sunlight to prevent damage to the coatings. Good housekeeping practices shall be followed, and valves should be kept away from dirt, chemicals, and any structure or other equipment that may cause damage. Lubricate flanges to prevent rust/corrosion build up. Valves should always have external apparatus protected.

TOP DASHPOT OPERATION

When the pump starts up, the flow of liquid will begin to operate the disc to the open position. The hydraulic fluid in the upper section of the hydraulic cylinder is slowly pushed through the top external flow control valve. The flow control valve is adjustable. This allows the operator to set the optimum valve opening speed.

When the pump shuts down, flow reversal will begin to operate the disc to the closed position. For the first 90% of the disc travel, the hydraulic fluid in the lower section of the hydraulic cylinder is slowly pushed through the bottom external flow control valve. This flow control valve is also adjustable. Again, this allows the operator to set the optimum closing speed for the first 90% of disc travel. The cylinder's internal cushion plunger then enters the cushion cavity. The needle adjustment screw located at the rod end of the cylinder allows for a finer speed control over the last 10% of disc travel.

TOP DASHPOT INSTALLATION (See drawing on pg 7)

Once the valve is installed in line, follow the steps below to adjust the top mounted dashpot.

1. Fully open the external flow control valve (26) located at the cap end and rod end of the hydraulic cylinder (2).
2. Back out the 10% cushion needle (36) located at the rod end of the cylinder four turns from bottom.
3. Pressurize the air/oil reservoir (13) to 15 to 20% of the water pressure on the downstream side of the air inlet valve (31). (Hydraulic fluid is added at the factory prior to testing. No fluid should be added unless spillage is observed).
4. Start the pump and allow the system operating pressure to stabilize. Observe the valve opening by watching the position indicator and closely listening for any sounds the valve may make.



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TOP DASHPOT INSTALLATION CONT. (See drawing on pg 7)

5. Stop the pump and observe the closing cycle. Again, observe the valve reaction by watching the position indicator and closely listening for any sounds the valve may make.
6. If surging is present when the valve opens, adjust the external flow control valve (26) located at the cap end of the hydraulic cylinder (2). If water hammer is present when the pump shuts down, adjust the external flow control valve (26) located at the rod end of the hydraulic cylinder (2).

TOP DASHPOT MAINTENANCE (See drawing on pg 7)

Once the valve is installed in line, follow the steps below to adjust the top mounted dashpot.

1. The air/oil reservoir (13) should be checked periodically for the proper air pressure. This should be done when the valve is in the fully closed position. The air pressure should be maintained at twenty percent of the pressure on the downstream side of the air inlet valve (31).
2. The fluid level in the air/oil reservoir (13) and oil reservoir (12) does not have to be checked unless spillage is observed. If spillage is observed, follow the procedure outlined below:
 1. The pump should be stopped and the valve should be in the fully closed position.
 2. Using the air inlet valve (31), bleed the air from the air/oil reservoir (13).
 3. Remove the plugs from the reservoir fill ports (28).
 4. Add hydraulic fluid until it comes to the top of the fill port. Mobil DTE24 hydraulic fluid or equivalent should be used. (Consult manufacturer for operating temperatures below 18°C [0°F])
 5. Replace plugs in reservoir fill ports (28).
 6. Using the air inlet valve (31) on the air/oil reservoir (13), pressurize the reservoir to 20% of the downstream operating pressure.
 7. Restart pump.

The connecting rod (3) and connecting rod bushing (10) should be lubricated as conditions dictate with non-toxic silicone valve seal lubricant grease such as Bel-Ray 1023 as manufactured by the Bel-Ray Company, Inc., Farmingdale, NJ. Never paint the connecting rod (3) or piston rod as this will void the warranty and damage the hydraulic seals.

ADJUSTMENT OF EXTERNAL FLOW CONTROL VALVES

1. From the closed position, open the flow control valve (26) by turning metal knob counter-clockwise until the desired flow volume is obtained. The colored band on the stem and the numerical readout indicate to what extent the valve is opened or closed. Each color on the color band represents one full turn.
2. Find the scribe mark on the upper surface of the flow control valve body (26). The number on the knob in proximity to the scribe mark will indicate 10ths of a turn the valve is opened.
3. Record the information for future reference.

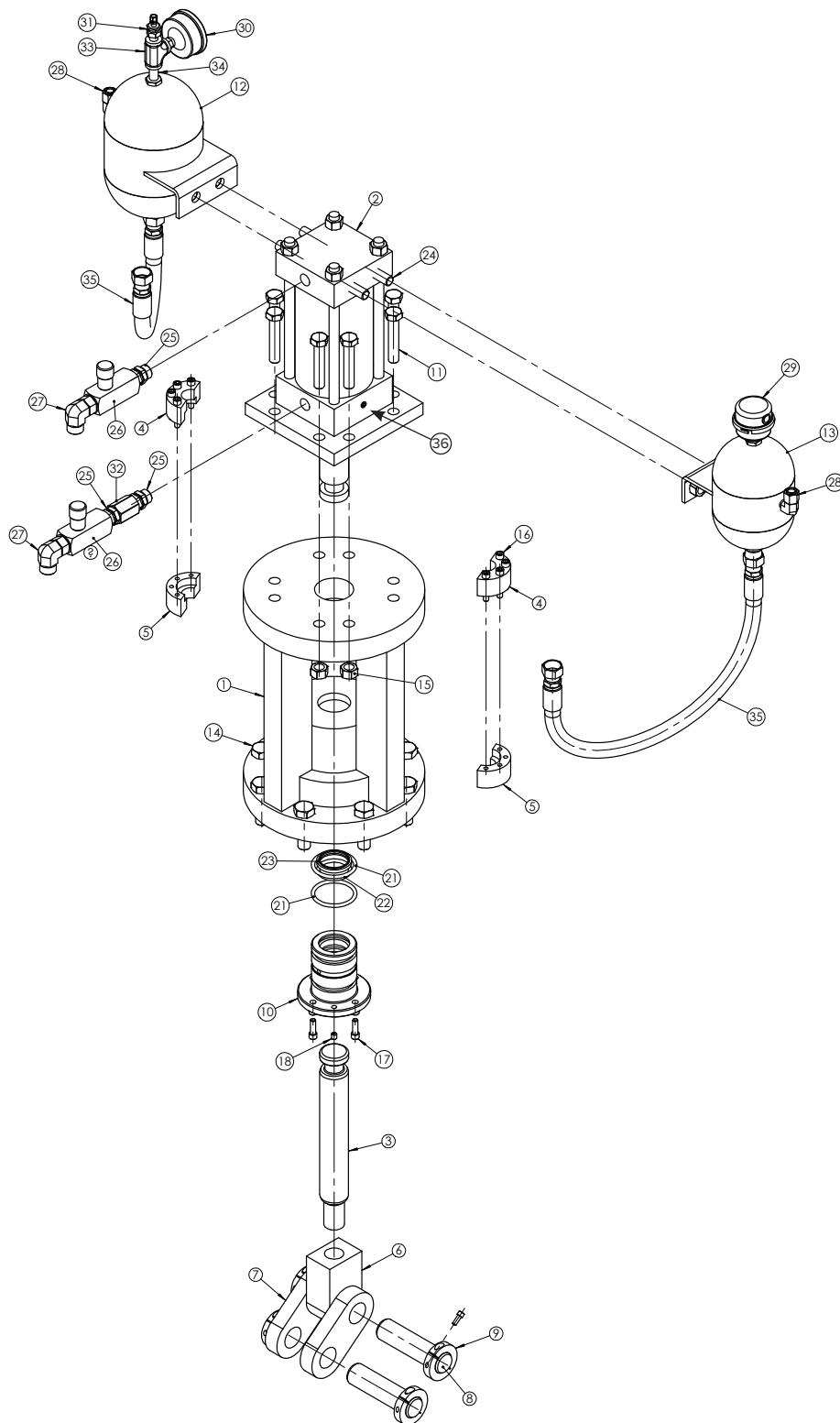
ADJUSTMENT OF CYLINDER'S INTERNAL CUSHION NEEDLE ADJUSTMENT

1. The last 10% of disc travel to the closed position is controlled by the 10% cushion needle (36) located at the rod end of the cylinder (2). Initially, the needle screw should be backed out four turns from bottom. Ideal valve operation should first try to be obtained by adjustment of the external flow control valve (26).
2. If this cannot be achieved, the 10% needle cushion (36) screw should then be gradually rotated ¼ turn clockwise. However, the needle adjustment screw should not be turned in any more than 2 full turns from bottom.



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Dashpot Parts List

ITEM	DESCRIPTION
1	DASHPOT STAND
2	HYDRAULIC CYLINDER
3	CONNECTING ROD
4	CYLINDER COUPLET
5	SHAFT COUPLET
6	ROD EYE
7	DASHPOT LINK
8	PIVOT PIN
9	PIN COLLAR
10	CON. ROD BUSHING
11	HEX HEAD CAP SCREW
12	OIL RESERVOIR
13	AIR/OIL RESERVOIR
14	HEX HEAD CAP SCREW
15	STD HEX NUT
16	SOCKET HEAD CAP SCREW (SHCS)
17	SHCS
18	SOCKET SET SCREW
19	GREASE FITTING
20	O-RING
21	O-RING
22	ROD SEAL
23	ROD WIPER
24	STUD
25	STRAIGHT THD UNION
26	EXT. FLOW CTRL VALVE
27	ELBOW
28	RESERVOIR FILL PORT
29	MINI AIR INTAKE FILTER
30	PRESSURE GAUGE
31	AIR INLET VALVE
32	STRAIGHT THREAD COUPLING
33	FEMALE TEE
34	NIPPLE
35	HOSE ASSEMBLY
36	10% CUSHION NEEDLE



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