

# CVS SERIES E 8 INCH GLOBE VALVE BODY

## Introduction

The 8" Series E is one part of a control valve assembly, and usually comes furnished with an actuator mounted to the valve body.

The instructions for the actuators and accessories are supplied separately, please refer to the appropriate instruction manuals for setup, installation, maintenance, and parts references.

## Description

The Series E is a single port, globe style control valve with composition or metal seats, and a balanced push down to close valve action plug.

There are two styles of valves available

1. Design "CVS ED" is intended for general control applications over a wide variety of temperatures and pressure drops. This design has an upper piston ring seal and metal-to-metal seating.
2. Design "CVS ET" is intended for applications requiring low leakage rates with composition seating (TFE) for tight shutoff requirements, or metal-to-metal seating for higher temperature capabilities. The valve plug has a two-piece upper seal.

For standard cages, the flow direction is flow down, with the following flow characteristics available: linear, quick opening, and equal percent.

The end connections are ANSI Class 150, 300, and 600 Raised Face, or Ring Type Joint flanges as per ASME B16.34-1996.

Approximate shipping weight 900 Lbs. (408 Kg).



Figure 1 CVS 8" Series E Control Valve with Type CVS 667 Actuator.

## Installation:

The CVS 8" Series E valve should not be installed in systems that exceed the ANSI specified temperature and pressure ratings.

Inspect the valves for shipping damage and foreign debris when uncrating.

1. Ensure the pipe is free of welding slag, chips, and other debris by cleaning out the lines before installation.
2. Install approved gaskets between the valve body and the pipeline flanges.
3. CVS recommends a standard three-valve maintenance by-pass be installed. This allows isolation of the valve body without shutting down the pipeline system.
4. Install the valve so that the flow direction arrow on the body coincides with the actual process flow through the valve.
5. Although the valve can be installed in any position, the typical installation has the actuator vertical above the valve body. Support for the actuator will be necessary if there is vibration in the line or if the valve body is positioned 45 degrees or more below vertical.

## Maintenance:

Before beginning any maintenance, it is important to isolate the control valve and release all pressure contained in the valve body and the actuator. Disconnect any operating lines providing air pressure, control signals or electrical power to the actuator.

*Note:* Caution must be used in the disassembly. The seating surfaces and surface finish of the cage; seat ring, stem, and plug are critical for proper sealing. Nicks and scratches will affect the ability to seal the valve in the future.

## Disassembly:

1. Disconnect and remove the actuator from the body.
2. Remove the nuts or cap screws from the bonnet flange
3. Thread one of the actuator stem locknuts onto the stem and continue threading it down to the bottom of the thread run out.
4. Remove the bonnet by lifting it straight up with a hoist. Attach the hoist by either a double cable hoisting sling under the bonnet or by the lifting rings attached to the packing flange stud bolts or on the 5" yoke bosses to two yoke stud bolts 180° apart.
5. Caution must be used when lifting the bonnet to ensure that it clears the body and stud bolts completely. Any damage to the seating surface will compromise its future sealing ability
6. To prevent damage to the seating surface, place the bonnet-valve plug assembly on a wooden or cushioned surface.

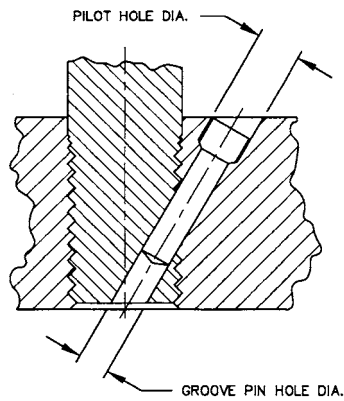
## Replacing the Plug Stem or Load Ring:

1. Unscrew the locknuts from the stem
2. Loosen the packing flange nuts
3. Lean the bonnet over
4. Draw the plug and stem out of the bonnet.

If valve plug is damaged it will be necessary to replace both the valve plug and stem. If the stem is damaged, a new valve stem can be inserted in the original valve plug.

## Replacing the Stem

1. Remove the old groove pin
2. Remove the old stem, and replace with new stem.
3. Tighten the new stem until the thread bottoms out against the plug.
4. Drill through the stem using the hole in the valve plug as guide. Remove any chips or burrs and drive in a new groove pin to lock the assembly. Refer to Table 2, groove pin drill sizes.



**Table 1**  
**Valve Stem Torque and Groove Pin drill sizes**

Valve Stem Conn. (VSC)		Torque Min / Max Values		Groove Drill Size
Inches	mm	Lbf•Ft	N•m	Inches
3/4	19.1	237-339	175-250	3/16
1	25.4	420-481	310-355	1/4

**Note:**

Use a new groove pin when installing a new stem. Vibration may loosen the stem if using an old groove pin.

**Assembly:**

1. Ensure all gasket surfaces are clean.
2. Replace the valve plug piston ring or seal ring with a new ring.
3. Assembly for design:
  - 3.1. “CVS ED” Design bodies:  
For valve bodies using a carbon filled TFE piston ring, at the split, slightly spread the ring and install it over the stem and into the piston ring groove on the valve plug. Graphite piston rings are supplied as a complete ring and must be broken into two sections. The piston ring can be broken in half by scoring, and then breaking over a hard surface i.e.) edge of a table. Ensure the broken ends are re-matched when the piston ring is installed in the piston ring groove.

3.2 “CVS ET” Design bodies:

Apply a lubricant to both back-up ring and seal rings. Install the back-up ring over the stem and into the piston ring groove. Place the seal ring over the top edge of the valve plug, so that it slips into the groove on one side of the valve plug.

**Cautiously** stretch the seal ring to work it over the top edge of the valve plug. Avoid jerking sharply on the seal, as the TFE in the seal ring needs time to cold flow during the stretching procedure. This stretching procedure may make the seal ring seem loose in the groove, however it will contract to its original size after installation of the cage.

4. Replace the seat ring gasket, and install the seat ring. If using a composition seat (TFE), assemble it by placing the TFE disc onto the disc retainer and then sliding this assembly over the disc seat.
5. Place the cage onto the seat ring. Any rotational orientation of the cage with respect to the valve body is acceptable.
6. To ensure a good seal, clean all sealing surfaces and examine surfaces for nicks and scratches. Place the bonnet gasket in position.
7. Slide the valve plug assembly in the cage, and then position the load ring on top of the cage.
8. Place the bonnet on the body ensuring that the pipe plug (or lubricator) is on the downstream side of the body.
9. Using good bolting practices bolt the bonnet to the body. (Lubricate the studs and nuts using good quality lubrication). Tighten the bolts alternately.  
Correct tightening of the bonnet bolts accomplishes two objectives.
  - a.) To compress the bonnet gasket to form a seal with the body joint.
  - b.) Bolt loads are transmitted to the cage through the load ring, which creates a sealing load for the seat ring gasket.
10. Mount the actuator to the bonnet and make up the stem connection. Refer to “Making up the stem connection” for proper procedure.

## Packing Lubrication:

The use of semi-metallic packing requires the use of a lubricator or lubricator/isolating valve (Figure 2). The lubricator or lubricator/isolating valve is mounted in place of pipe plug (Key 14, Figure 7, 8). For standard service up to 450°F, use Dow Corning lubricant or equivalent. Do not lubricate packing used in oxygen service.

**Lubricator** -To add lubricant to the packing box, turn the cap screw in a clockwise direction.

**Lubricator/Isolating Valve** - open the isolating valve, turn the cap screw in a clockwise direction, and then close the isolating valve.

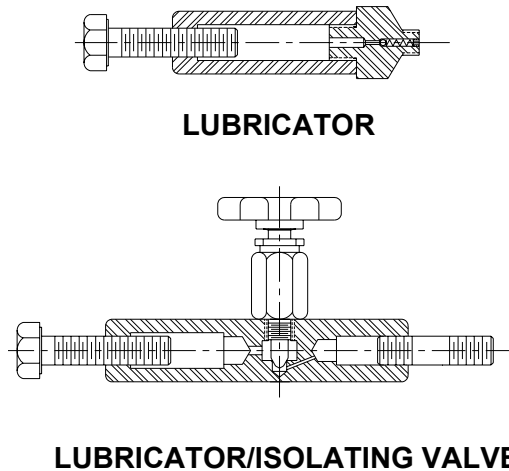


Figure 2 - LUBRICATOR AND LUBRICATOR/ISOLATING VALVE

## Replacing TFE V-Ring Packing

1. After the stem and valve plug have been detached from the bonnet, the following parts can be removed:
  - 1.1 Packing nuts (key 20)
  - 1.2 Packing flange (key 18)
  - 1.3 Wiper ring (key 25)
  - 1.4 Packing follower (key 26)
2. The old packing (key 21) can be removed by one of two methods
  - 2.1 Remove the packing by pushing it out using a rod inserted through bottom of the bonnet.
  - 2.2 Use a packing hook to remove the packing. **Note:** To avoid damaging the packing box walls use caution.

3. Clean the packing box bore, and all metal parts. Complete all required maintenance.
4. Slide the valve plug into the cage already in the valve body, install the load ring on the cage, and use a new bonnet gasket. Mount the bonnet to the valve body.
5. Complete the installation of the packing as illustrated in figure No.8.

**Note:** Extra caution should be taken not to damage the packing during the installation process.

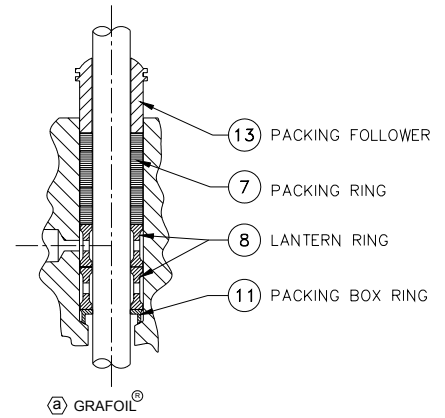
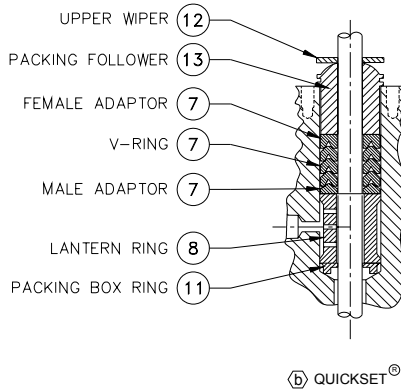
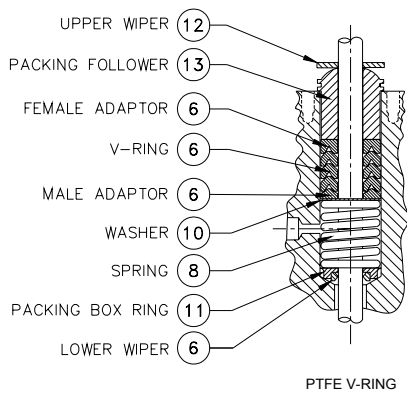
6. Replace the packing flange (Key 3); tighten the packing flange nuts (Key 5) until shoulder of packing follower (Key 13) is approximately 5/8" from the top of the bonnet. If leakage is detected around the packing follower, tighten the packing flange nuts until leakage stops.
7. For graphite packing, tighten the packing flange nuts to the maximum torque value in Table 4. Then back off the nuts and retighten them to the minimum torque value in Table 4.
8. For other Packing Types, in small equal increments tighten the flange nuts until one of the nuts reach the minimum torque shown in table 4. Then tighten the other nut until the packing flange is level.
9. Mount the actuator and set the stem connector to the required travel. Refer to "Making up the stem connection" procedure.

Table 2 Body to Bonnet Torque

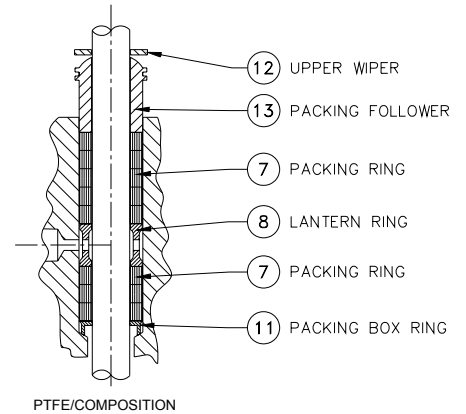
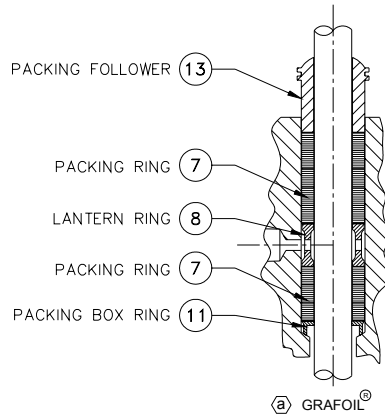
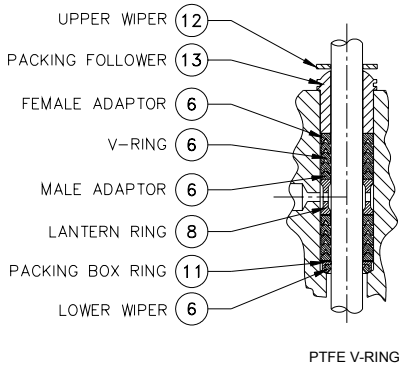
	BOLT TORQUES			
	SA 193-B7, B8M <sup>a</sup>		SA-193-B8M <sup>b</sup>	
	N • m	Lbf • ft	N • m	Lbf • ft
8	746	550	529	390
<small>a - Strain Hardened b - Annealed</small>				

**Table 3 - Torque values for Packing Flange Nuts**

Valve Stem Diameter		ANSI Rating	PTFE Type Packing				Graphite Type Packing			
			Min. Torque		Max. Torque		Min Torque		Max. Torque	
Inches	mm		Lbf·ft	N·m	Lbf·ft	N·m	Lbf·ft	N·m	Lbf·ft	N·m
3/4	19.1	150	47	5	70	8	99	11	149	17
		300	64	7	95	11	133	15	199	23
		600	87	10	131	15	182	21	274	31
1	25.4	300	108	12	162	18	226	26	339	38
		600	149	17	223	25	310	35	466	53



**SINGLE PACKING**  
 ALL YOKE SIZES



**DOUBLE PACKING**  
 ALL YOKE SIZES

**NOTES:**

- (a) GRAFOIL IS A REGISTERED TRADEMARK OF UNION CARBIDE
- (b) QUICKSET IS A REGISTERED TRADEMARK OF GARLOCK INC.

Figure 4 - Packing Arrangements-See Table 3 for recommended torque values.

## Lapping Metal Seats:

In any valve body, a certain amount of leakage should be expected with metal-to-metal seating. However, if the leakage becomes excessive, lapping can enhance the condition of the seating surfaces of the valve plug and seat ring. Deep nicks in the seating surfaces should be removed by machining rather than lapping. There are many lapping compounds available commercially. Be sure to use one of high quality. Apply lapping compound to bottom of plug. In order to position the cage and seat ring properly and to help align the valve plug with the seat ring, bolt the bonnet to the body with gaskets (the old gaskets can be used) in place during the lapping procedure. A simple handle can be made from a piece of metal secured to the valve stem with nuts. Rotate the handle in opposite directions to lap the seating surfaces. Once lapping is complete, disconnect bonnet, clean the seating surfaces, reassemble, and then test for shutoff. If leakage is still excessive, repeat lapping procedure.

## Making up the stem connection:

### Direct-Acting Actuators

1. Move the valve plug to the closed position.
2. Thread the actuator stem locknuts to the bottom of the plug stem threads. Position the travel indicator disc, cupped edge downward, over the stem  
Apply enough spring force to the actuator stem to ensure the actuator is in the "full up" position.
3. Move the actuator stem to the full downward position by applying full loading pressure to the diaphragm case. Measure the distance between the lower end of the actuator stem and the travel indicator disc on the stem locknuts.
4. Slowly decrease the load on the actuator, allowing the stem to rise up approximately 1/8 of an inch. Using the two-piece stem connector and cap screws, secure the actuator stem and valve plug stem together.

5. Place the travel indicator disc against the bottom of the stem connector. Secure the disc in place with the upper locknut. Adjust the travel indicator scale so it reads "closed."
6. Relieve the diaphragm loading pressure and check for sufficient travel. (i.e.) Movement of valve plug to the fully "Open" position. Tighten the lower stem locknut against the upper locknut. The connection is now complete.

### To increase desired length of travel:

1. Loosen both stem locknuts away from the stem connector by approximately 1/4 inch and then tighten them together.
2. This adjustment will allow a wrench to be used on the locknuts to screw the valve plug stem to the desired position.
3. **Caution:** ensure that the valve plug is not seated while being rotated. Do not exceed the 1/8 " adjustment made in step 4.
4. Retighten the stem connector and locknuts after adjustment.
5. Reposition the travel indicator scale to reflect the change.

## Making up the Stem Connection

### Reverse-Acting Actuators

1. Close the valve plug ensuring the valve plug is on the seat
2. Supply enough spring force to the actuator stem to ensure the actuator is in full "Down" position. Increase the loading pressure to the diaphragm case to allow the actuator stem to rise sufficiently so the locknuts can be screwed onto the valve plug stem. Thread the locknuts down on the valve plug stem as far as possible. Set the travel indicator on the locknuts, "cupped" edge downward.
3. Slowly release the pressure in the diaphragm case, allowing the actuator to return to the full down position. Measure the distance between the lower end of the actuator stem and the travel indicator disc.

## **Reverse-Acting Actuators Cont.**

4. Increase the load on the actuator, causing the stem to rise up approximately 1/8 of an inch. Using the two-piece stem connector and cap screws, secure the actuator stem and valve plug stem together.
5. Move the travel indicator disc against the bottom of the stem connector.
6. Secure the disc with the upper locknut. Change the travel indicator scale so that it reads closed.
7. Open the valve plug by increasing the diaphragm loading pressure. Secure the lower stem locknut against the upper locknut. The connection is now complete.
8. To increase travel see "To increase desired length of travel"

## **Parts ordering:**

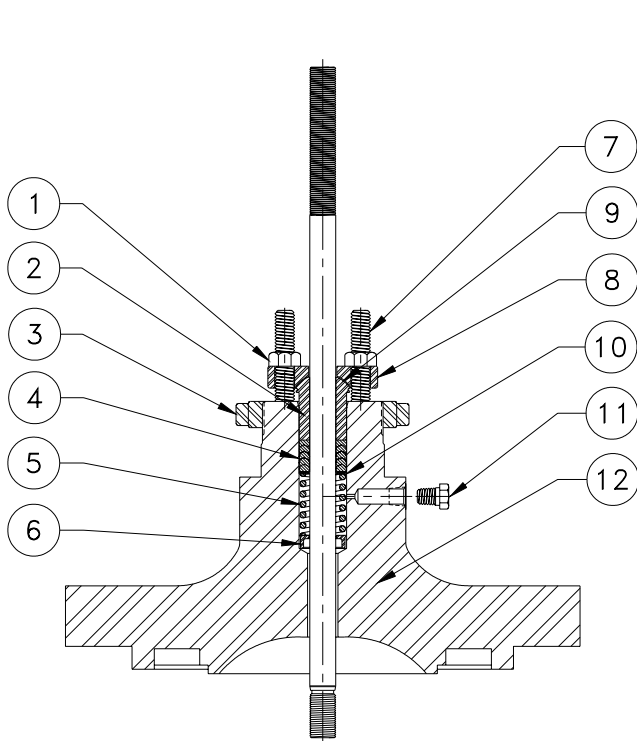
The serial number identifies every CVS 8" Series E valve body – bonnet assembly, which can be found on the front of the valve. Please quote this number when communicating with a CVS sales representative.

# 8" Series E Parts Reference List

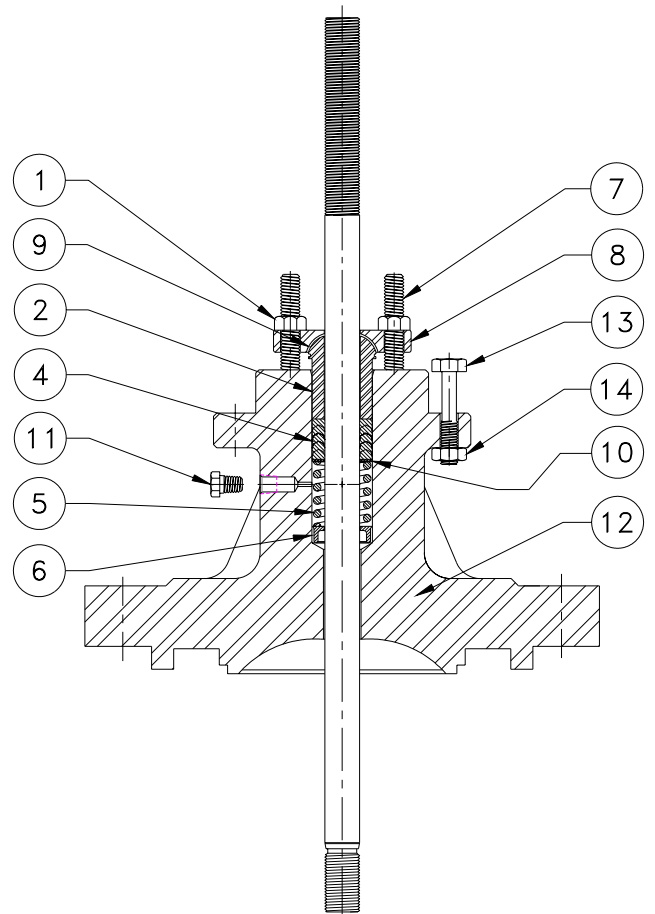
## PLAIN AND EXTENSION BONNET

Key	Part Name	Key	Part name
1	Nut	10	Special Washer (TFE packing only)
2	Packing Follower	11	Plug
3	Locknut	12	Bonnet
4	Packing Set	13	Cap screw
5	Spring / Lantern Ring	14	Nut
6	Packing Ring Box	15 <sup>1,2</sup>	Lubricator or Lubricator/Isolating Valve
7	Stud	16	
8	Packing Flange	17	
*9	Upper Wiper		

(\* ) Recommended Spare Part, (1) Not Shown, (2) See Packing Lubrication



CVS 8" Series E Standard Bonnet  
3-9/16" Yoke Boss, 3/4" Stem

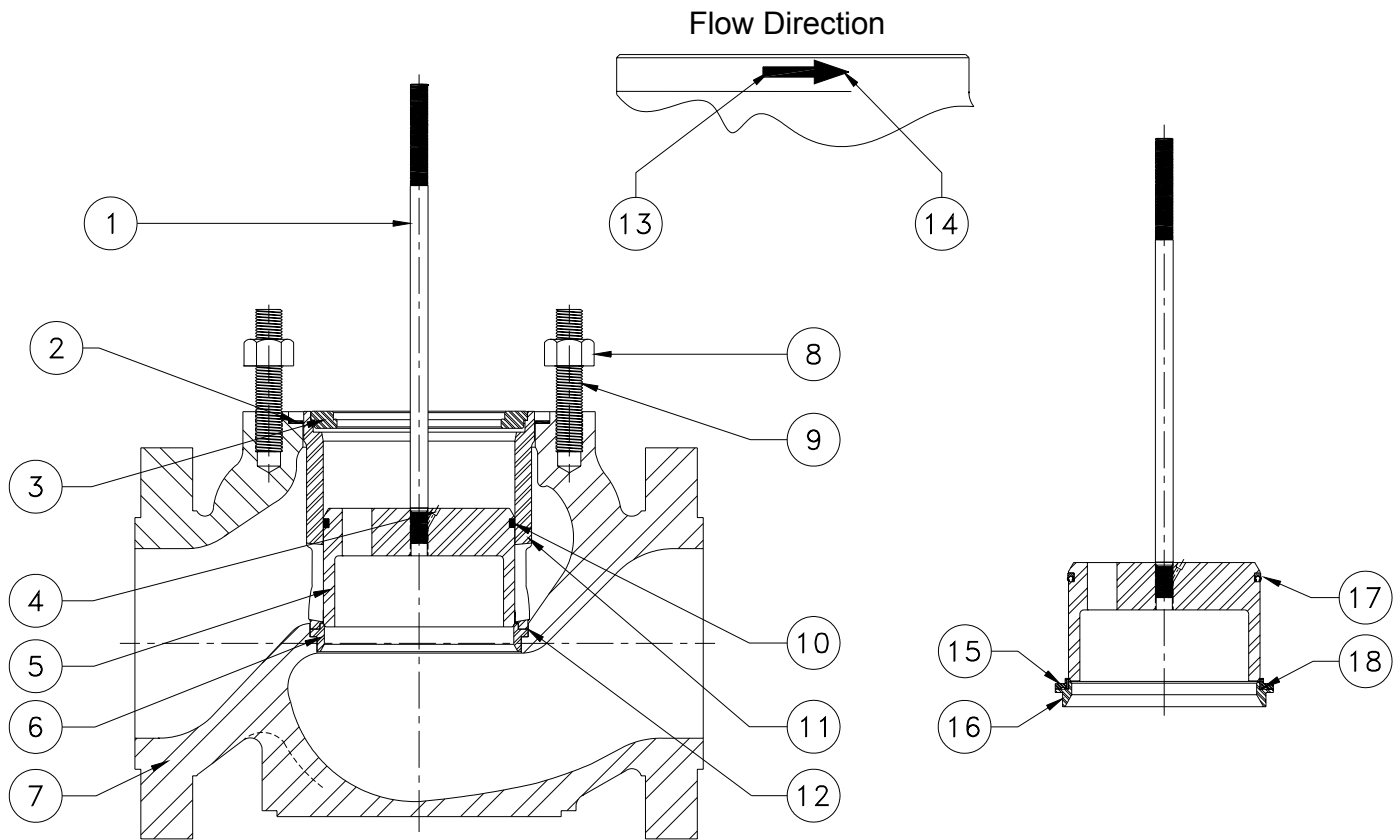


CVS 8" Series E, Extension Bonnet  
5" Yoke Boss, 1" Stem

# 8" Series E Parts Reference List

## BODY

Key	Part Name	Key	Part name
*1	Valve Plug Stem	14	Drive Screw
*2	Bonnet Gasket	15	Disc Retainer (Composition Seat)
3	Load Ring	16	Disc Seat (Composition Seat)
*4	Groove Pin	17	Seal Ring (CVS ET only)
5	Valve Plug	*18	TFE Disc (Composition Seat)
*6	Seat Ring	(*) Recommended Spare Parts A - Consult CVS Sales Representative for material availability	
7 <sup>A</sup>	Body		
8	Hex Nut		
9	Stud		
*10	Piston Ring (CVS ED only)		
11	Cage		
*12	Seat Ring Gasket		
13	Flow Arrow		



"CVS ED" Construction  
Metal Seat Ring

"CVS ET" Construction  
Composition Seat Ring

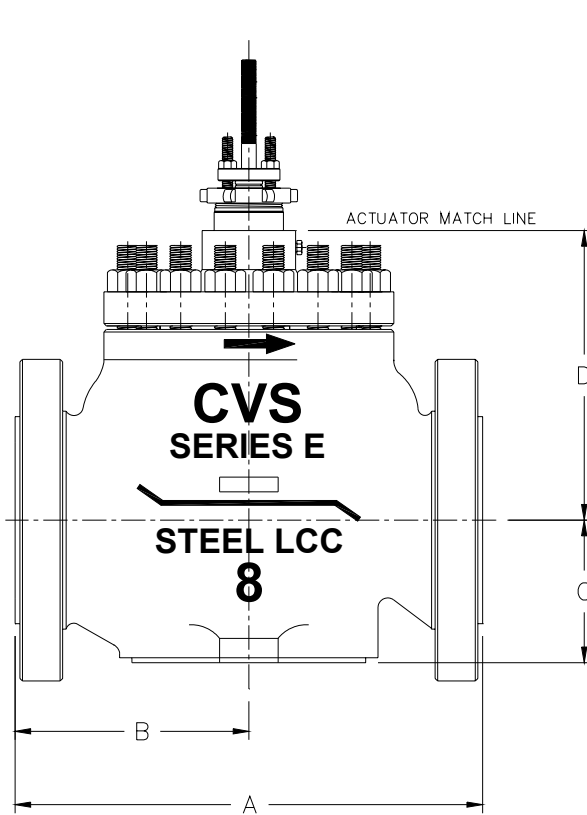
# 8" SERIES E DIMENSIONAL DATA

## END CONNECTION STYLE

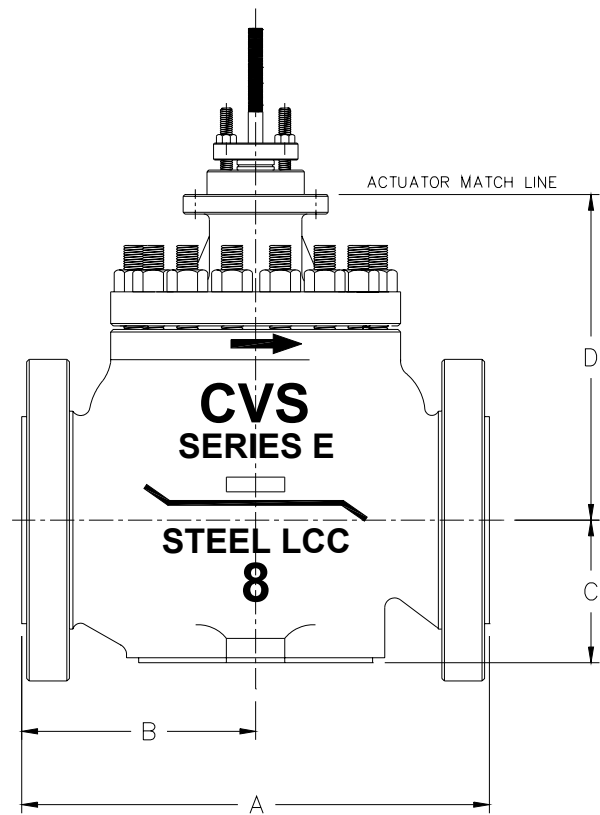
VALVE SIZE		DIMENSION "A" <sup>a</sup>											
		150 RF		150 RTJ		300 RF		300 RTJ		600 RF		600 RTJ	
In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm
8	203	21.38	543	21.88	556	22.38	568	23.00	584	24.00	610	21.12	613

a - Dimension B=DimA/2

VALVE SIZE		DIMENSION "D" STANDARD BONNET STEM DIAMETER		DIMENSION "D" EXTENSION BONNET STEM DIAMETER		DIMENSION "G" Max	
		3/4 Inch	19.1 mm	3/4 Inch	19.1 mm		
In	mm	Inch	mm	Inch	mm	Inch	mm
8	203	14.75	375	16.56	421	7.50	191



CVS 8" Series E with Standard Bonnet with 3-9/16" Yoke Boss, 3/4" Stem



CVS 8" Series E with Extension Bonnet with 5" Yoke Boss, 1" Stem