

Specifications

Sizes: 1" and 2"

Connections: Female NPT, Flanged, Butt Weld,
Socket Weld

Body Type: Globe, Tee (1" only), Angle (2" only)

Temperature Range:

CV10 (close coupled): -50° F to 200° F

CV15 (open yoke): -50° F to 400° F

Trim Characteristic: Quick Open, Modified %
(Throttling)

Trim Size: 0.25", 0.375" (3/8"), 0.50", 0.75", and
1.00"

Pressure Rating: 4000 psi (-50° F to 200° F), 3755
psi at 400° F

Shutoff: ANSI Class IV

Actuator Sizes: No. 35 (35 in² area), No. 70
(70 in² area)

Input Signal Ranges: 3-15 psi, 6-30 psi

Application

The CV10/CV15 are compact, cage-guided valves also known as a dump valves. They are ideally suited for a wide range of applications such as pressure control, level control and flow control. Typical installations include separators, scrubbers, wellheads and other production equipment. The CV10 is a close coupled design and the CV15 is an open yoke design.

CV10 Reverse



Figure 1.

CV15 Reverse



Figure 2.

Model CV10/CV15 Installation

Installation

Before installing the CV10/CV15 make sure the threads aren't damaged and are clear of any debris on the vessel and valve. Install the CV10/CV15 according to your needs (Flow under seat, flow over seat). Thread in a 1/4" NPT fitting into the actuator (Upper housing for direct, lower housing for reverse). Connect an instrument that provides a pneumatic signal to the CV10/CV15.

Actuator Action

When connecting a pneumatic signal it is important to understand the differences between a reverse and direct acting actuator. If it's reverse acting (fail close) the signal needs to be connected to the port in the lower housing. For a direct acting (fail open) the signal needs to be connected to the port in the upper housing. See figure 4.

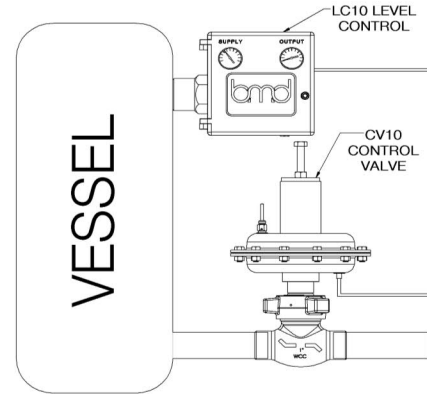


Figure 3. Typical Installation of CV10 w/ LC10 Level Controller

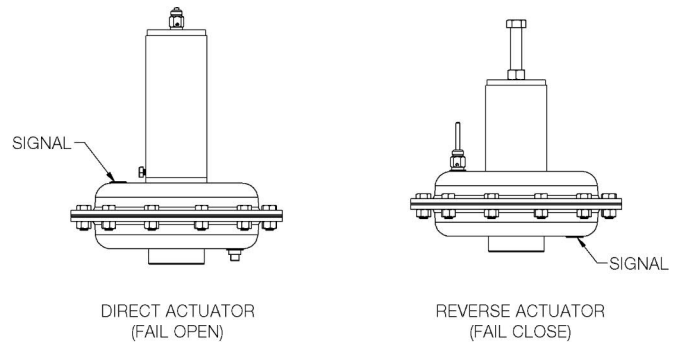


Figure 4.

Model CV10/CV15 Operation

Operation

The CV10 operates by receiving a pneumatic signal that, depending on the action of the actuator, will open or close the valve. For Reverse acting as shown in figure 4 the pneumatic signal enters in the lower housing. The pressure builds and overcomes the spring force allowing the plug to lift off the seat. For Direct acting as shown in figure 4 the pneumatic signal enters into the upper housing. The pressure builds and overcomes the spring force causing the plug to lower onto the seat.

Valve Adjustment

To adjust a valve with a reverse acting actuator loosen the adjusting screw nut and turn the adjusting screw CW to increase the seat load and CCW to decrease the seat load. Increasing the seat load will allow the valve to shut-off against higher pressures, but it will also require a higher actuation pressure. For a #35 actuator size, 3-15 psi spring range, use a 3/4" wrench. For all other actuator size and spring range combinations use a 15/16" wrench. For a direct acting actuator the seat load will be increased by increasing the signal pressure to the valve actuator.

Model CV10/CV15 Maintenance

Maintenance:

Trim Replacement

Before changing the trim, make sure the CV10 is closed off from service. For a reverse acting actuator a pneumatic signal is needed to lift the plug off of the seat before removing the topworks from the body. Once air is supplied, break loose the hammer nut and remove the topworks. Use the cage removal tool to remove the cage from the body. Install the new cage and o-ring. Make sure the cage is pressed down and fully seated in the body. Remove the spring pin from the plug and unscrew the plug from the stem. The spring pin is best removed by using a small punch and hammer to drive it out. Insert the stem back through the packing plug and screw on the actuator. Screw on the new plug and install the new pin. Insert the topworks back onto the body and torque down the hammer nut. For a direct acting arrangement a pneumatic signal is not necessary and previous steps can be applied.

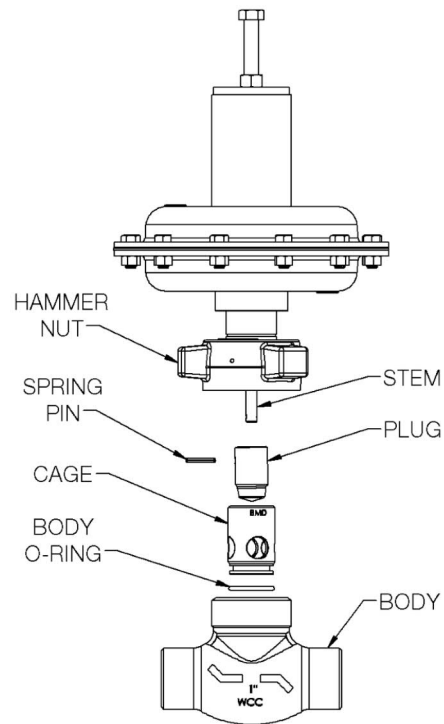


Figure 5.

Packing Replacement

Before replacing the packing, refer to the previous section and follow the instructions until the spring pin and plug are removed. Then, unscrew the actuator from the packing plug. Once the stem and actuator housing are removed from the packing plug, the packing can be removed. Remove the packing washer and spring. The packing itself can either be pushed out from the top of the packing plug or pulled out with a pick tool. Be careful not to scratch the bore of the packing as this can cause the valve to leak. Inspect the stem for damage as well. Any grooves or scratches on it can cause leakage through the packing. Before installing the new packing kit, put the packing plug back onto the stem and tighten the actuator onto the packing plug. Install the new packing, packing spring, and packing washer.

NOTE: BMD recommends greasing the packing set well with a PTFE based grease to enhance service life.

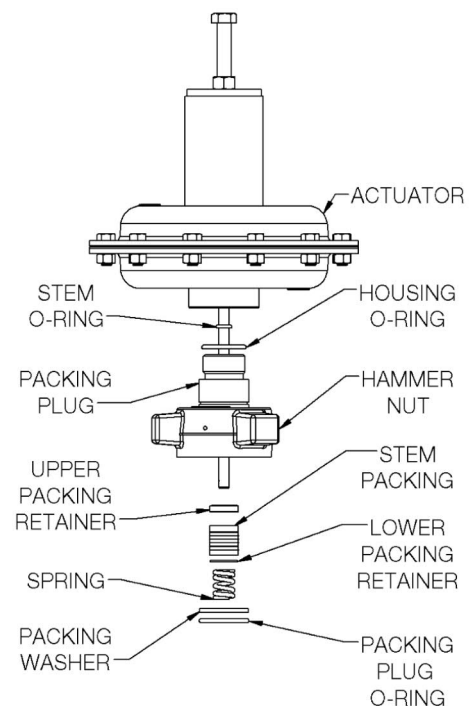


Figure 6.

Model CV10/CV15 Maintenance Cont.

Diaphragm Replacement

In order to replace the diaphragm the topworks must first be removed from the valve, and the plug must be removed from the stem as described in the trim replacement section. For a reverse acting actuator loosen and remove the adjusting screw. For a direct acting actuator remove the spring cover, and loosen the hex nut that is on top of the upper spring retainer. Unscrew and remove all the bolts holding the upper and lower housing together. While holding the hex nut below the diaphragm, remove the jam nut and hex nut above the diaphragm. (On a direct acting actuator the upper stem will be removed instead of the upper jam nut and hex nut.) Remove the lock washer, diaphragm o-ring, diaphragm plate, and diaphragm. Install a new diaphragm and diaphragm o-ring and reassemble the housing.

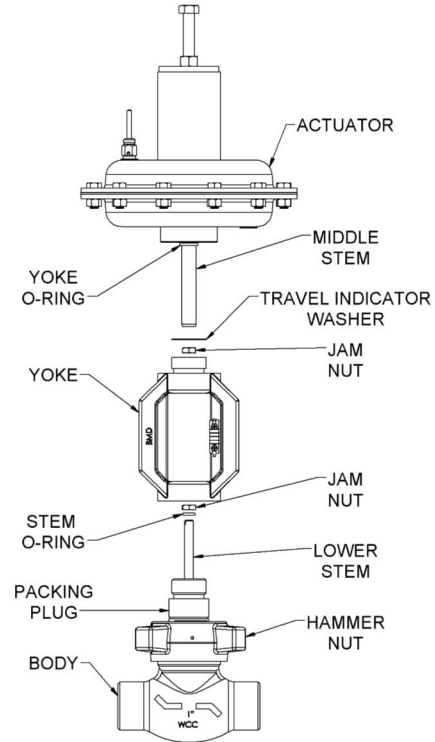


Figure 7.

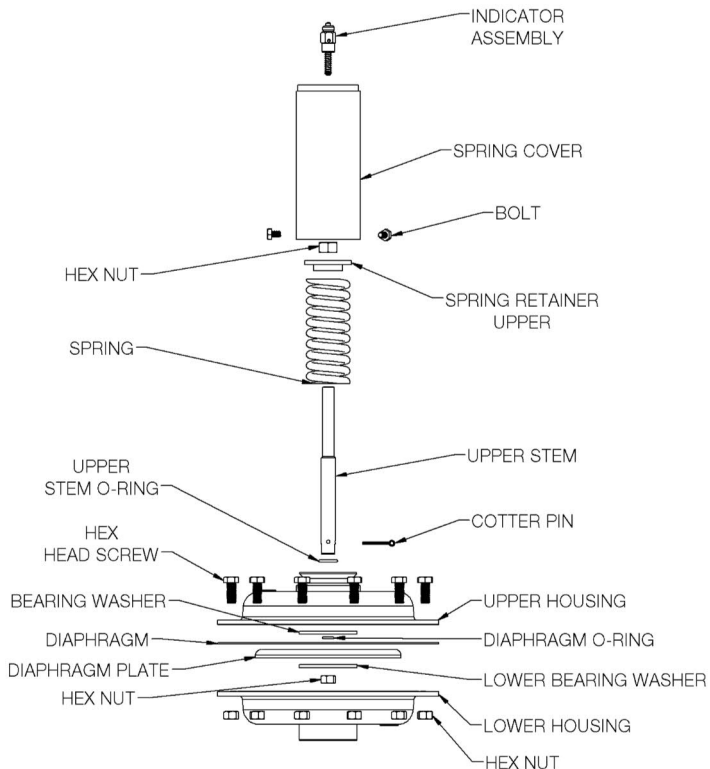


Figure 8.

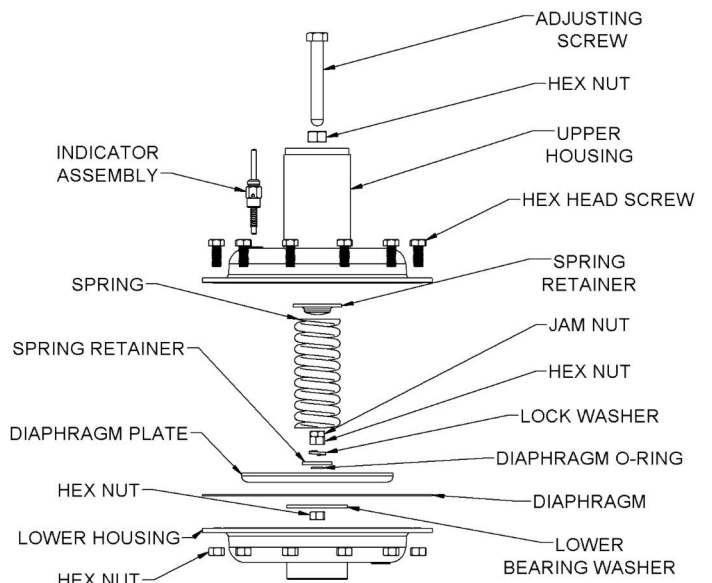


Figure 9.

Model CV10/CV15 Maintenance Cont.

Table 1. Trouble Diagnosis

Symptom	Probable Cause(s)	Corrective Action(s)
In the closed position, process fluid leaks from inlet to outlet port	Insufficient spring tension for reverse-acting (fail close) actuator	Increase spring tension and watch for the leak to stop
	Excessive spring tension on direct-acting (fail open) actuator	Reduce spring tension and watch for leak to stop
	Insufficient supply pressure to a direct acting actuator (fail open)	Increase signal pressure
	Direct-acting (fail open) actuator thrust output diminished due to either a failed o-ring around the upper stem or a punctured actuator diaphragm	Apply supply pressure to actuator then remove the spring cover. Check for leakage around the o-ring where the upper stem enters the upper diaphragm house and the diaphragm from the opening of the vent plug installed in the lower diaphragm housing. Apply soapy water to inspect for leaks if necessary. Disassemble actuator, inspect and replace seal component as necessary.
	Trim is worn or damaged or failed seat/cage-to-body o-ring	Remove the actuator assembly at its hammer nut and the seat/cage from its body. Inspect the valve trim and o-ring seal components. Restore trim and/or replace components as necessary.
	Differential pressure shut-off requirement exceeds the thrust output available from the actuator	First, record the valve serial number, model number, flow direction, current trim size and service conditions. Then call your BMD representative to verify actuator sizing and shut-off capability.
Process fluid leaks into lower diaphragm housing	Bonnet-to-valve stem packing and bonnet-to-valve stem o-ring failed. The valve stem may be worn or damaged. If you cannot see the leak outside of the pipe, the bonnet weep hole is plugged.	Disassemble the actuator and valve. Inspect the o-ring and the sealed surfaces of the bonnet and stem. The packing must have some installation fit interference with both. Replace worn component(s) as necessary. If the bonnet weep hole is plugged than clean it out.
Process fluid is leaking from the bonnet weep hole	The bonnet-to-valve stem packing failed and the valve stem may be worn or damaged	Disassemble the actuator and valve. Inspect bonnet and stem sealing surfaces. The packing must have some installation fit interference with both. Replace the worn component(s) as necessary.

Model CV10/CV15 Maintenance Cont.

Table 1. Trouble Diagnosis Cont.

Symptom	Probable Cause(s)	Corrective Action(s)
Process fluid is leaking from between the hammer nut and bonnet and/or valve body	Bonnet-to-valve body o-ring failed	Remove the actuator assembly at the hammer nut. Inspect the o-ring and sealing surfaces of the bonnet and valve. Replace the worn component(s) as necessary
In Reverse-acting (fail close) actuators only: Supply pressure leaks from around the actuator stem at the top of the yoke window opening or from the bonnet weep hole	The actuator stem-to-yoke o-ring failed or the valve stem-to-bonnet o-ring failed	Disassemble the actuator and inspect the o-ring, yoke and actuator stem sealing surfaces. Disassemble the actuator and valve and inspect the o-ring, bonnet and valve stem sealing surfaces. Replace any worn components.
Direct-acting (fail-open) actuator only: Supply pressure leaks from around the base of the spring cover on top of the upper diaphragm housing	The actuator stem-to-upper diaphragm housing o-ring failed	Disassemble the actuator and inspect the o-ring, back-up ring and sealing surfaces of the stem and housing bore. Replace the worn components as necessary
Supply pressure is leaking from the diaphragm housing vent plug when the valve is not moving	The actuator diaphragm is punctured	Disassemble the actuator and replace the diaphragm and diaphragm-to-diaphragm plate o-ring
The valve will not open completely OR the valve will not close completely	The actuator spring has excessive tension or the supply pressure is too weak to override the spring (or both)	Decrease spring tension until the flow is achieved; increase the actuator supply pressure if required
The valve is fully closed and will not open	The supply pressure line is connected to the wrong side of the actuator or the reverse-acting (fail close) actuator spring is completely compressed resulting in the inability to lift the valve plug	Make sure the actuator's supply pressure source line is connected to the lower diaphragm housing. Then decrease the spring tension until valve is open far enough to allow full travel

Model CV10/CV15 Maintenance Cont.

Table 1. Trouble Diagnosis Cont.

Symptom	Probable Cause(s)	Corrective Action(s)
The valve is fully closed and will not open. (Continued)	The direct-acting (fail open) actuator cannot vent supply pressure due to a non-relieving pressure source device	Replace the supply pressure source device with one that relieves pressure or install a 3-way vent valve at the actuator supply connection
	In a reverse-acting (fail close) actuator, the supply pressure may be the problem and in a direct-acting (fail open) actuator, the spring tension may be insufficient to open the valve plug	If you have a reverse-acting (fail close) actuator, increase the supply pressure. If you have a direct-acting (fail open) actuator, increase the spring tension. For both, an increase in supply pressure may be required to re-close the valve
	The static differential pressure combined with the trim size and the direction of the inlet "flow-over" may exceed the available thrust of the actuator opening	Record the valve's serial number, model number, current trim size and services conditions. Contact your BMD representative to verify actuator sizing and shut-off capability
The valve will not close. It is stuck fully open.	In a reverse-acting (fail close) actuator, the supply pressure cannot be vented due to a non-relieving pressure source device	Replace the supply pressure source device with one that is able to relieve pressure, or install a 3-way vent valve at the actuator supply connection
	The supply pressure line is connected to the wrong side of the actuator. If it's a direct-acting (fail open) actuator, the spring may be fully compressed and unable to create valve plug movement	Make sure that the actuator supply pressure source line is connected to the upper diaphragm housing. Decrease the spring tension to the minimum necessary to achieve full opening at the operating conditions
The valve movement is sluggish or unusually slow.	There may be actuator seal leakage	Perform the correlating corrective action suggested
	The opening of the diaphragm housing vent plug is partially blocked	Remove the vent plug and unclog the opening

Model CV10/CV15 Maintenance Cont.

Table 1. Trouble Diagnosis Cont.

Symptom	Probable Cause(s)	Corrective Action(s)
The valve movement is sluggish or unusually slow. (Continued)	If you just installed the valve, the actuator supply pressure volume may be too low. If the valve has been in use for a while, the volume has diminished over time due to clogged openings and/or filters in control devices/ regulators	Increase the supply pressure line size and/or install a volume booster. Clean the openings and clean/ replace the filters of the control devices according to the manufacturer's recommendations
<p>The inlet flow direction is over the seat and the trim size is 1/2" or larger (this is generally applicable to throttling service only)</p> <p>On initial opening, the valve instantaneously travels to full open or near full open position (there is no valve position control over travel range.)</p>	<p>The actuator opening thrust required (by overcoming static differential pressure) to open the valve plug is greater than the opposing actuator spring force (tension) adjustment</p>	<p>Slowly increase the spring tension and check the movement of the valve opening. Slowly increase the tension until the valve plug lift is controllable. An increase in the actuator supply pressure may also be required</p>
	<p>The spring force (tension) requirement for the particular service conditions exceeds the capabilities of the actuator being used</p>	<p>Write down the valve serial number, model number, current trim size and service conditions. Then contact your BMD representative to verify the actuator sizing.</p>
<p>Generally applicable to throttling service only:</p> <p>The closed valve is leaking or will not open against static differential pressure even with the actuator spring tension adjusted to correspond with the control instrument signal start point</p>	<p>The actuator spring force (tension) necessary to achieve a tight shut-off OR overcome the static differential pressure holding the valve plug closed against the seat is more than the forces coming from the actuator or the supply pressure</p>	<p>Record the valve serial number, model number, current trim size and service conditions. Then contact your BMD representative to verify that the actuator has sufficient thrust capability. You may need a valve positioner to:</p> <ol style="list-style-type: none"> 1. Achieve accurate valve response to the control instrument signal that a simple spring tension adjustment would not fix 2. Make use of all available actuator thrust for shut-off up to maximum actuator rating.