

VALVE ALIGNMENT TROUBLESHOOTING

2-POSITION VALVES ON AIR OR STANDARD ELECTRIC ACTUATORS

Technical Note 101

CHROMATOGRAPHIC SYMPTOMS OF MISALIGNMENT

By far the most common symptom of misalignment is restricted or blocked flow in one position. When a valve and actuator are not properly aligned, the rotor is thrown with excessive force against one side of the valve body cutout but doesn't go all the way to the other. (Figure 1) When the rotor pin is not against the cutout, the engraved flow passages on the rotor do not fully intersect the ports in the valve body, resulting in restricted flow in that position. If the flow is restricted in both positions there is a different problem, such as an actuator which doesn't throw far enough or a rotor with engravings deformed from overheating.

A less common symptom is the appearance of multiple peaks or doublets. This can occur in valve configurations with either very small or very large rotor engravings, with the sweeping action of the misaligned rotor giving the appearance of multiple injections.

CAUSES OF MISALIGNMENT

A valve and standard electric or air actuator ordered as a unit are shipped from the factory accurately aligned and ready to use. (Microelectric and universal actuators are self-aligning, so misalignment is typically never a problem.) However, any time the screw in the clamp ring on the actuator is loosened, such as when a valve/standoff assembly is installed through a bracket or an oven wall, the alignment will change. To increase the likelihood of getting valve and actuator back together properly, use a soft pencil or felt tip pen to make a mark on the standoff in line with the slot in the clamp ring. When these are lined up on reassembly, factory alignment is approximated.

In all cases except valves with no mounting holes, a valve can be removed from the standoff or close-mount assembly without affecting alignment by removing the screws shown at the extreme right in Figures 2 and 3. The alignment is not changed so long as the screw in the CR3 (for standoff) or CR4 (for closemount) is not loosened. However, any time the clamp ring screw is loosened, the alignment must be checked.

The second most common cause of alignment problems is the cumulative shock and wear of heavy use. Over time this can cause a clamp ring screw to loosen, allowing the valve to move out of alignment. If you can see the valve moving relative to the actuator you have this type of alignment problem. Often a little lubricant on the clamp ring screw will allow further tightening, but the clamp ring and screw may need to be replaced.

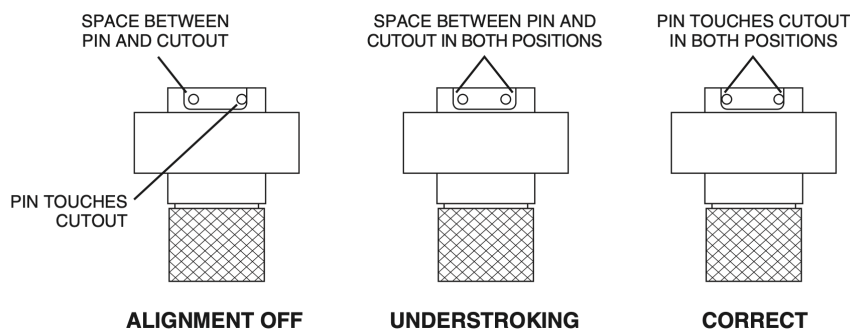
It is also possible for air actuators to become weakened due to internal leakage as O-rings wear. To check for this, remove one of the air inlets to the actuator and apply pressure to the other inlet. If air escapes from the non-pressurized inlet, the O-rings need to be replaced. (Product Number OR for a standard actuator, or ORT for a high temperature actuator.) If no leak is detected, reverse the air fittings to repeat the test with pressure from the opposite direction. (Sometimes the O-rings will leak in one direction and not the other.)

A final source of trouble, which again applies only to air actuators, is inadequate pressure. Although typically valves will throw at 40 to 60 psi, some high temperature or high pressure models may require more. (Our actuators are rated at 100 psi.) If there is adequate pressure at the source and the actuator still does not cycle the valve completely, check the solenoid air valves for leakage or failure.

VISUALLY CHECKING THE ALIGNMENT ON VALCO VALVES

It is important to note that the actuator drives only the rotor within the valve body (via the slotted coupling or standoff driveshaft): the valve body remains stationary with respect to the actuator. To check the alignment, cycle the actuator from one position to the other and observe the location of the rotor pin. (Figure 1) The rotor pin should come to rest against both sides of the cutout in the valve body. If it doesn't, realignment is necessary. (If you have a valve with no mounting holes, it is impossible to do this visual check.) If the pin does not contact the stop in either position, the actuator does not stroke far enough. Technical Note 408 and the two position electric actuator manual contain instructions for adjusting the stroke of an electric actuator. For an air actuator, consult the factory.

FIGURE 1: Visually checking the alignment on Valco valves (rotor pin shown in both positions)



ALIGNMENT PROCEDURE

NOTE: For this procedure to work, there must be continuous rotational torque applied to the valve. With standard electric actuators this is automatic, but air actuators which have been installed with a Valco Digital Valve Interface or with two 3-way solenoid valves will not allow it. The DVI or solenoids must be bypassed so that gas is supplied directly to the actuator.

1. After determining that alignment is necessary, actuate the valve to the position in which the rotor pin is against the stop.
2. Slightly loosen the screw in the CR3 or CR4 clamp ring, allowing the actuator to complete its travel. The valve should rotate a few degrees.
3. Tighten the clamp ring screw and cycle the actuator to the other position. The pin should come to rest against the stop. If it does not, repeat the procedure. If after several attempts the pin still does not contact the stop in both positions, the actuator probably does not stroke far enough.

CHECKING THE ALIGNMENT WHEN A VISUAL CHECK IS NOT POSSIBLE

Since the pin cannot be seen on Cheminert valves and on Valco valves with no mounting holes, the only evidence of proper alignment is proper function. First, read the note above under Alignment Procedure. Then align the valve by slightly loosening and then re-tightening the clamp ring screw in both actuator positions. If flow is equal in both positions, the valve is aligned. (When comparing flow rates, be sure that there is no loop or tubing restriction masquerading as valve restriction.)

MOUNTING HARDWARE EXAMPLES

Since Valco valves on air actuators are very common in gas chromatography, this combination is used in the examples below. While the same procedures apply to Cheminert valves, some of the hardware product numbers may be different. Consult your VICI catalog.

FIGURE 2: Valco valve (two mounting holes) on an actuator with closemount hardware

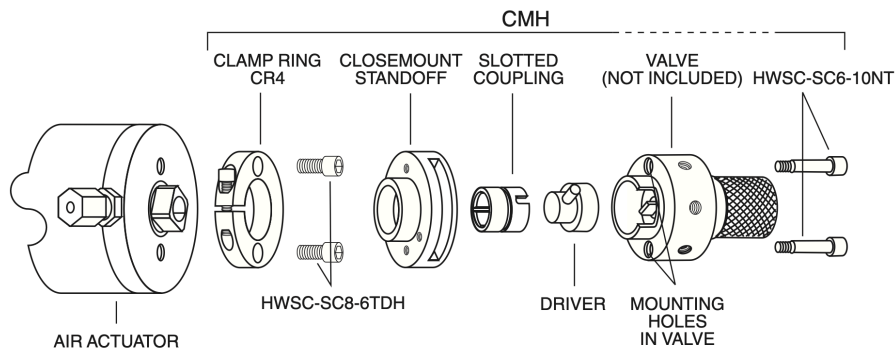


FIGURE 3: Valco valve (two mounting holes) on an actuator with a standoff assembly

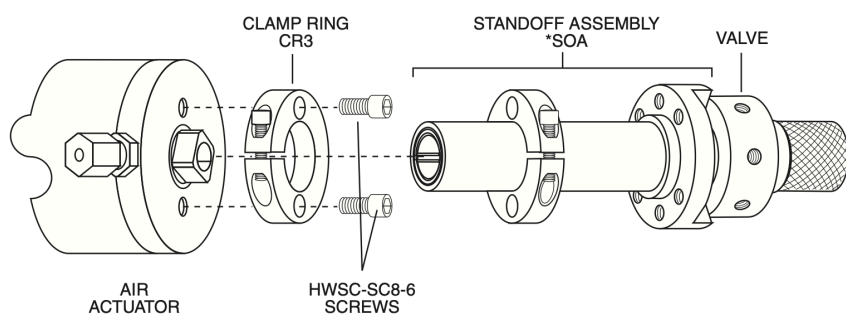


FIGURE 4: Valco valve (no mounting holes) on an actuator with closemount hardware

