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AIR & ELECTRICALLY* ACTUATED CHEMINERT® MULTIPOSITION VALVES

OPERATION NOTES & ALIGNMENT INSTRUCTIONS

Technical Note 814

INITIAL PRECAUTIONS

After unpacking the valve, do not remove the protective tape from the valve ports until you are ready to install the valve. As supplied, all surfaces are clean and free of contaminants, and must be kept clean to prevent valve damage. Open ports and fittings cause unnecessary risk of particulate matter entering the valve and scratching the sealing surfaces, which is the most frequent cause of premature valve failure.

CAUTION: Failure to observe proper cleanliness procedures during the installation of the valve voids the manufacturer's warranty.

Best results will be achieved when fittings are made according to the correct procedures. Refer to Technical Note 503 for VICI Valco zero dead volume metal fitting instructions and Technical Note 505 for Cheminert flangeless fitting instructions. (All VICI manuals and technical notes are available in the support section of our website at www.vici.com)

Clean tubing and fittings are also essential for optimal operation. In the case of metal tubing, we suggest purchasing our electrolytically pre-cut and polished tubing, available in standard lengths for any plumbing requirement. If other metal tubing is to be used, make sure that all tubing ends are free of burrs and cut square with the tube axis, and that the tubing has been cleansed of all chemical and mechanical contamination generated by the cutting process. VICI Valco also offers plastic tubing in pre-cut lengths, with bare square cut ends or with Cheminert 1/4-28 flanged fittings installed. Like metal tubing, plastic tubing cut to length should be cut square with the tube axis.

As with all sampling and selector valves, we strongly recommend the use of in-line filters at sample entry points.

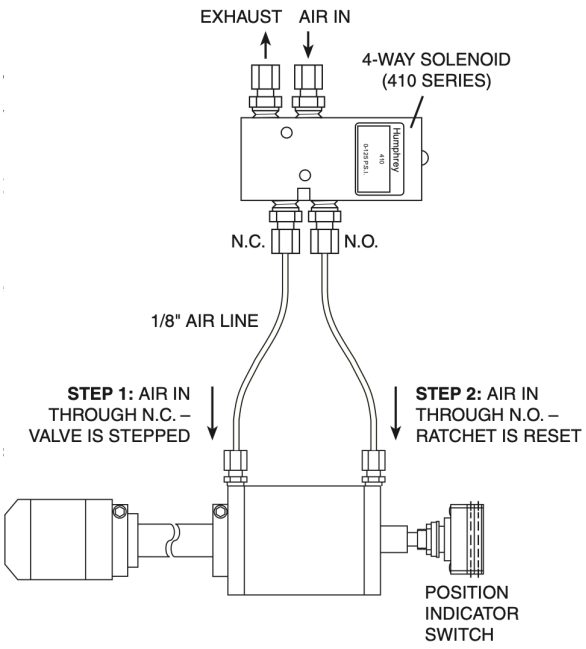
**For a microelectric actuator, refer to Technical Note 415*

AIR ACTUATOR IMPLEMENTATION

Use of a 4-way solenoid is recommended for multi-position valves. Air is continuously applied to the actuator, which is directed to step or reset by the solenoid. One external event energizes the solenoid to step the valve to its next position and then de-energizes the solenoid to reset the mechanical ratchet in the actuator.

The solenoid is activated by contact closures supplied by microprocessor-based instruments, data systems, or valve programmers. (Most of the time an additional relay is needed.)

FIGURE 1: Solenoid/actuator configuration



STANDARD ELECTRIC ACTUATOR IMPLEMENTATION

NOTE: For information on micro-electric actuator implementation, refer to Technical Note 415, available online in the support section of www.vici.com.

The actuator consists of (a) the actuator assembly, (b) a control box with LED display, and (c) a 20-conductor cable for interface to a computer, data system, etc. When the actuator power cord is plugged in, the LED display in the control box will show the position of the actuator and valve. To move the valve to the next position, momentarily move the three position toggle switch (normally off) toward "STEP" on the control box. The control box display will indicate the new position. If the toggle switch is moved momentarily toward "HOME", the actuator will move the valve to Position 1, or "home". Once in the home position (position 1), the actuator will not rotate another 360° if "HOME" is accidentally hit a second time.

Any of these operations may also be performed by a computer or data system with the capacity to provide external events control, via the interface cable provided. The computer or data system input/ output signal must be either negative true logic or a contact closure. For more information, consult the standard electric actuator manual shipped with the actuator or available online in the support section of www.vici.com.

VALVE ALIGNMENT

When the valve arrives from the factory installed on an actuator, it is accurately aligned and ready for use. However, anytime the clamp ring on the actuator is loosened, as when removing the valve from the actuator for mounting through an instrument panel or oven wall, the valve and actuator must be realigned so that the internal ports and slots on the rotor intersect properly (see Causes of Misalignment, on the next page).

CAUTION: Before removing the valve from the actuator, mark the factory-aligned position of the valve.

Close mount: Make temporary registration marks on the face of the valve where it lines up with the slot in the stainless clamp ring on the actuator.

Standoff: Make temporary registration marks on the standoff tube where it lines up with the slot in the black anodized clamp ring on the actuator. Do not remove the valve from the standoff assembly.

When this mark is lined up with the slot on reassembly, the factory alignment will be approximately reproduced as long as the valve and the actuator remain in their original positions.

CHROMATOGRAPHIC SYMPTOMS OF MISALIGNMENT

1. LOSS OF FLOW OR BLOCKED FLOW
   When the valve body, rotor, and actuator are not in proper alignment, the ports of the valve do not completely intersect the engravings on the valve rotor. In the worst case there is no flow in any position. However, slight misalignment may eliminate flow from ports on one side of the valve only. With a rotometer or with a line placed into liquid, flow may be observed between positions as the actuator cycles the valve.
2. MIXING OF SAMPLES
   In some configurations with large ports and their corresponding large engravings which are very close together, poor alignment can cause mixing of samples even when a flow restriction has not been observed. This may be manifested as "ghost" peaks or poor reproducibility.

CAUSES OF MISALIGNMENT

1. REMOVAL OF THE VALVE FROM THE ACTUATOR FOR MOUNTING
   As referred to earlier, mounting valves through a bracket or oven wall requires that the valve or valve and standoff assembly be separated from the actuator. In the case of a valve on a standoff, this is accomplished by using a hex driver to loosen the socket head screw in the black anodized clamp ring on the actuator (**Figure 2**). In the case of a close-mounted valve, removal is accomplished by using a hex driver to loosen the socket head screw in the stainless clamp ring on the actuator (**Figure 3**).

   Any time the socket head screw in the actuator clamp ring has been loosened, the alignment of the valve after replacement on the actuator should be checked. The chances of proper alignment after reassembly are greatly enhanced by following the suggestion in the caution at the top of this page.
2. SHOCK FROM HEAVY OR CONTINUOUS USE
   Occasionally, when valves are used in applications requiring a high-duty cycle, wear or shock can cause the screw and clamp ring to loosen. Instrument vibration may have the same effect. This allows the standoff to move, causing inaccurate rotor rotation. The most obvious symptom is an observable movement of the standoff, valve, or actuator, which normally should not move when the valve is actuated.
3. INADEQUATE PRESSURE OR VOLUME AT THE AIR ACTUATOR
   Failure to move completely to the next position may occur due to inadequate air pressure or volume at the actuator. Air actuated valves may require more than the standard 50 psi for proper operation. (They may be safely operated at up to 100 psi.) If adequate pressure is available at the source and the actuator still fails to complete the cycle, the solenoid used to control the gas pressure which is applied to the actuator should be inspected for leakage or failure. Other possible problems include restricted supply lines and worn out actuator O-rings.

FIGURE 2: Standoff assembly connecting actuator and valve

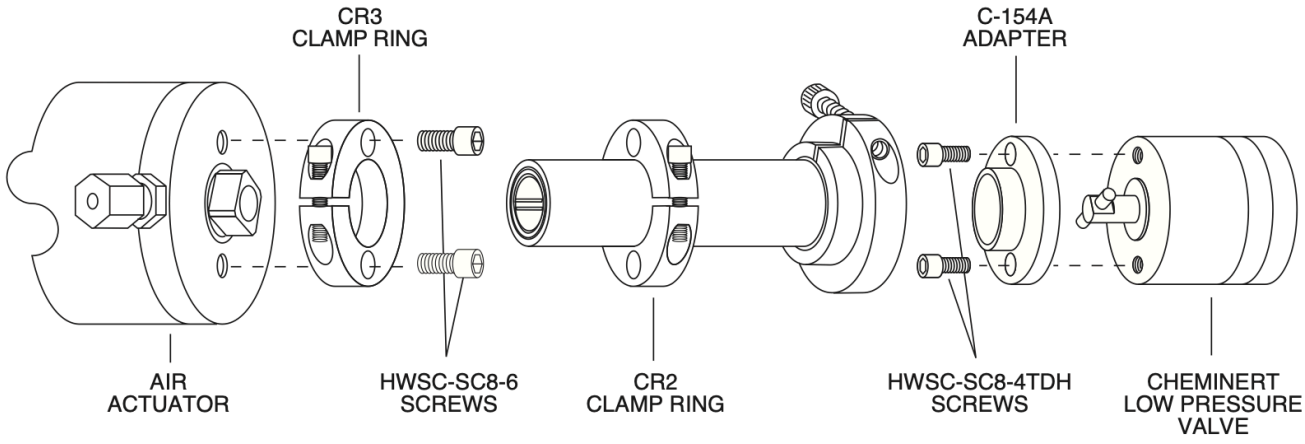
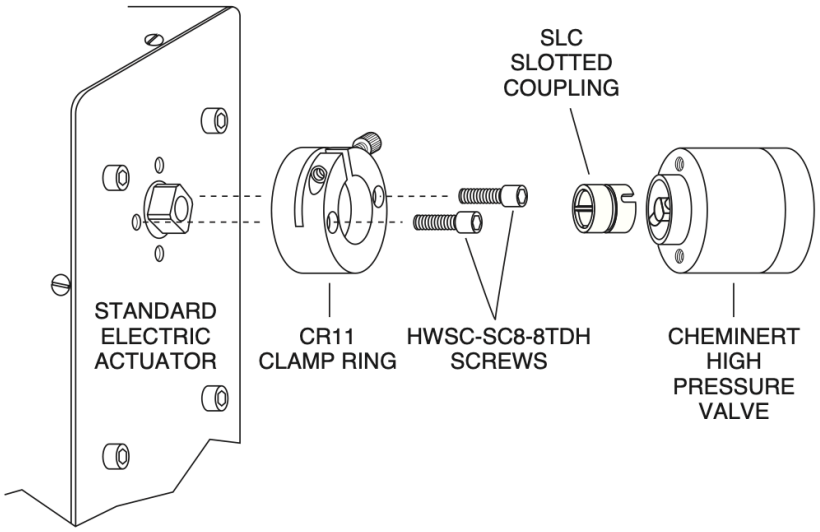


FIGURE 3: Closemount high pressure valve on standard electric actuator



ALIGNMENT PROCEDURE

1. Step the actuator to Position1, or "home". This is clear with an electric actuator, but an air actuator has no built-in position indication. Position indication may be supplied by a VICI Valco Multi-position Control Module (MCM), Serial Valve Interface (SVI), or Electronic Position Indicator (EPI). In one of these devices or some other method provides the air actuator with a "pulsed" rather than continuous air supply, override or disable the means of pulsing the air so that pressure is continuously applied to the actuator port nearest the valve.
2. Place the valve or valve\standoff assembly on the actuator.

   For a valve on a standoff, make sure the standoff butts all the way against the actuator so that the drive mechanism is completely engaged. Tighten the socket head screw in the CR3 clamp ring (**Figure 2**) enough to keep the standoff from falling out when it is released, but make sure it is loose enough to allow the assembly to be turned during the alignment procedure.

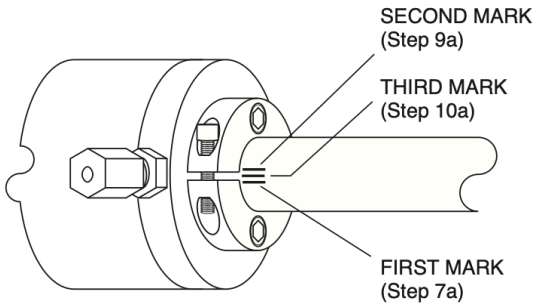
   For a close-mount valve, make sure that the slots of the slotted coupling engage the ends of the rotor pin. Tighten the socket head screw in the CR4/clamp ring (**Figure 3**) enough to keep the valve from falling out when it is released, but make sure it is loose enough to allow the valve to be turned during the alignment procedure.
   NOTE: Low pressure Cheminert valves require an adapter (C-154A) which allows them to be secured by the actuator clamp ring.
3. Establish a flow of clean gas (50 psi is adequate) into the inlet port. With one exception, the inlet is the port in the center of the valve cap. The exception is the Model C35Z, with the inlet by itself beside the two rows of ports and angled away from the actuator.
4. Designate port 1. Since the ports of Cheminert multi-position valves are not numbered, Position 1 can be any port you wish to designate (other than the inlet). Put a small mark beside it with a felt- tipped marker so you can keep track of it.

Since air actuators and standard electric actuators rotate in opposite directions, the instructions must be separated from this point on. If you have an electrically-actuated valve, skip to the next page.

FOR AIR ACTUATED VALVES

NOTE: When listening for flow, it is helpful if the fittings are removed from the port under consideration but left in the adjacent ports. If all the fittings have been removed, install a loop connecting the two adjacent ports to better isolate the sound of this flow.

FIGURE 4: Marking valve or standoff during alignment procedure



5a. With the valve toward you like the face of a clock, grip the valve and rotate it counterclockwise until gas flows from the next port counterclockwise from port 1. (This could require only a few degrees of rotation or nearly a full revolution.) This sets up the "staging area" for the approach to Position 1.

6a. Continue a slow counterclockwise rotation until the first traces of flow are heard from the port of Position 1.

7a. While holding the valve steady, use a soft pencil or ink marker to make a mark on the standoff corresponding to the slot in the actuator clamp ring. This slot makes a clear fixed reference point for observing relative rotational positions. In the case of a close-mount valve, make this mark on the valve body. See **Figure 4**.

8a. Continue the slow manual counterclockwise rotation of the valve body through the point of peak flow and on until the flow stops or is barely perceptible, as in Step 6a.

9a. Make another mark as in Step 7a. (**Figure 4**)

10a. Make a third pencil mark between the first two and rotate the valve clockwise until this midway mark is reached. (**Figure 4**)

11a. While holding the valve steady, firmly tighten the screw in the clamp ring. The rotor should be properly positioned at the point of maximum flow when the actuator is stepped to the next position.

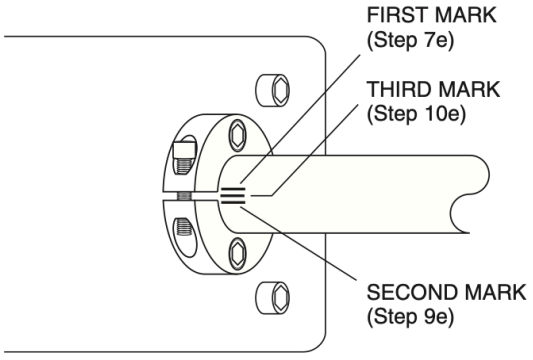
Congratulations, the procedure is complete. It is a good idea to cycle the valve through all its positions to be certain everything is functioning properly. In some cases it is possible to do an additional check by simply looking down the fitting detail and into the port as the valve is stepped from position to position.

Consult the factory if additional help is needed.

FOR ELECTRICALLY ACTUATED VALVES

NOTE: When listening for flow, it is helpful if the fittings are removed from the port under consideration but left in the adjacent ports. If all the fittings have been removed, install a loop connecting the two adjacent ports to better isolate the sound of this flow.

FIGURE 5: Marking valve or standoff during alignment procedure



5e. Turn the valve until there is flow from port 1. With the valve

toward you like the face of a clock, grip the valve and rotate it counterclockwise a few degrees past the point where flow stops from port 1. This sets up the "staging area" for the approach to Position 1.

6e. Slowly rotate the valve clockwise until the first traces of flow are heard from port 1.

7e. While holding the valve steady, use a soft pencil or ink marker to make a mark on the standoff corresponding to the slot in the actuator clamp ring. This slot makes a clear fixed reference point for observing relative rotational positions. In the case of a close-mount valve, make this mark on the valve

body. See **Figure 5**.

8e. Continue the slow manual clockwise rotation of the valve body through the point of peak flow and beyond, until the flow stops or is barely perceptible, as in Step 6e.

9e. Make another mark, as in Step 7e (**Figure 5**).

10e. Make a third pencil mark halfway between the first two and rotate the valve counterclockwise until this midway mark is reached (**Figure 5**).

11e. While holding the valve steady, firmly tighten the screw in the clamp ring. The rotor should be properly positioned at the point of maximum flow when the actuator is stepped to the next position.

Congratulations, the procedure is complete. It is a good idea to cycle the valve through all its positions to be certain everything is functioning properly. In some cases it is possible to do an additional check by simply looking down the fitting detail and into the port as the valve is stepped from position to position.

Consult the factory if additional help is needed.