

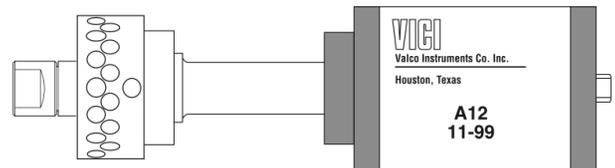
# AIR ACTUATED UW TYPE MULTI-POSITION SELECTORS

## OPERATION NOTES & ALIGNMENT INSTRUCTIONS

### Technical Note 705

#### 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. As with all sampling and selector valves, we strongly recommend the use of in-line filters at sample entry points. Streams should be filtered to 10 microns or less.



**NOTE:** The most common source of particulate and chemical contamination is tubing which has not been properly cleaned before installation on the valve. To avoid this problem, VICI Valco suggests purchasing our electrolytically pre-cut and polished tubing, available in standard lengths for any plumbing requirement. If other tubing is to be used, make certain that all tubing ends are burr-free and cut square with the tube axis, and that all tubing has been chemically and mechanically cleaned.

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

To ensure minimum connection volume, make certain the tubes are seated completely before forming the one-piece Valco ferrule on the tube. (For complete fittings installation instructions, refer to Technical Note 503, available in the support section of [www.vici.com](http://www.vici.com).)

#### AIR ACTUATOR IMPLEMENTATION

Use of a 4-way solenoid is recommended for multi-position valves (**Figure 1**). 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.) Valve position can be indicated by use of Valco's Electric Position Indicator (EPI) or can be BCD encoded for computer interface using the Valco BCD

Encoder Board. The Valco Multi-position Control Module (MCM) has stand-alone capabilities, with remote operation, valve position indication, and last-sample contact closures. When combined with Valco's Stream Selection Module (SSM), the MCM can bypass unused positions.

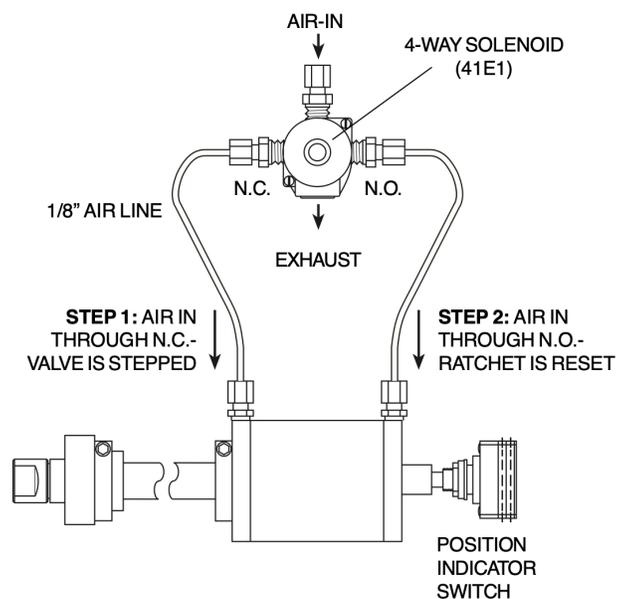
## VALVE ALIGNMENT

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, below.)

**NOTE:** 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 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.

FIGURE 1: Solenoid/actuator configuration



## 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. Often flow is cut to all positions, but a slight misalignment might eliminate flow from ports on one side of the valve only. In liquid applications, blocked flow may cause a pressure buildup, leading to pump shutdown or failure of other components. To confirm that misalignment is the problem, use a rotometer or a line placed into liquid to observe the momentary flow 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 valve from actuator for mounting

As referred to earlier, mounting valves through a bracket or oven wall requires that the valve or valve/standoff assembly be separated from the actuator. In the case of a valve on a standoff, this is accomplished by using a 9/64 hex driver to loosen the socket head screw (HWSC-SC8-8B) in the black anodized clamp ring (CR3) on the actuator (**Figure 3**). For valves utilizing a closemount assembly, the removal is accomplished by using a 7/64 hex driver to loosen the socket head screw (HWSC-SC8-8TDH) in the clamp ring (CR11) on the actuator (**Figure 4**). Any time these screws have 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 note above.

## 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 do 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 multi-position 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 actuators still fail 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. In addition, the supply lines should be checked for any restriction.

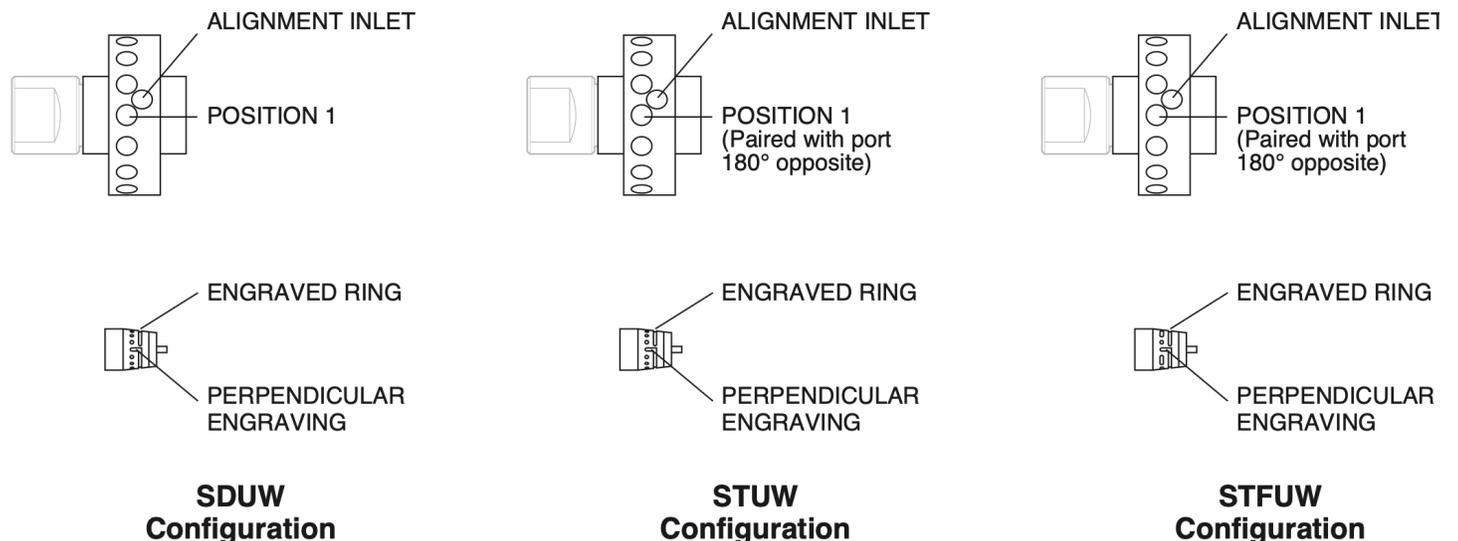
## ALIGNMENT PROCEDURE

**NOTE:** The alignment procedures for electrically actuated and air actuated valves are not the same. For electrically actuated valves, *see Technical Note 706, Operation Notes and Alignment Instructions, Electrically Actuated UW Type Multi-position Valves.*

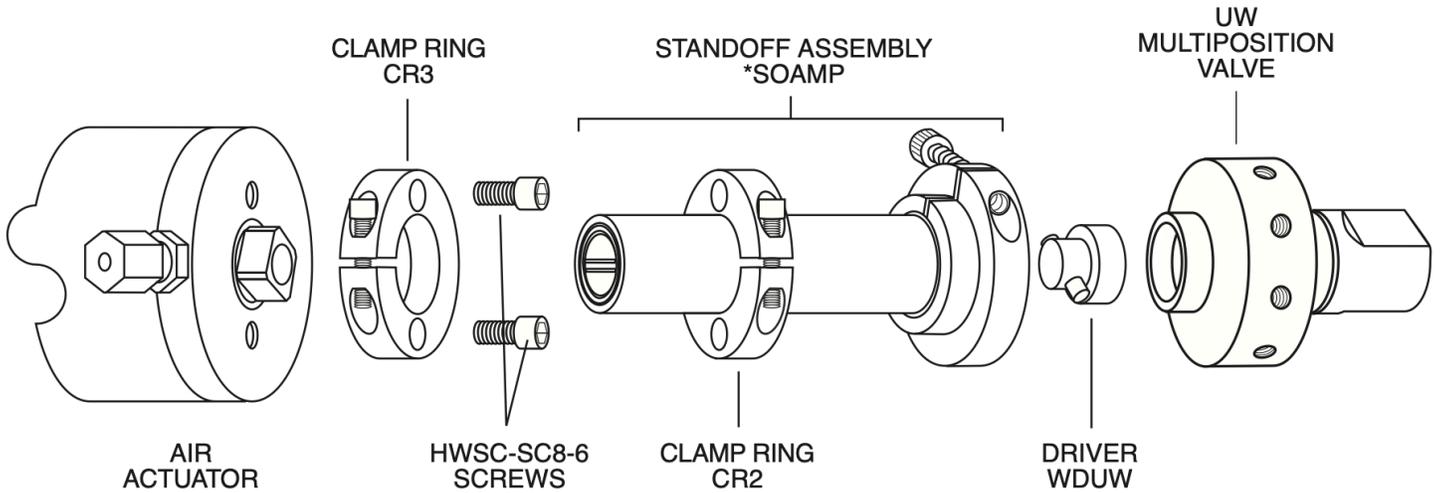
## DESCRIPTION

UW valves have one row of ports evenly spaced around the circumference of the body. See Figure 2. In addition, there are one or two "common" ports offset toward the actuator. (On ST or STF valves with two offset ports, the ports are 180° opposite, so only one is visible in Figure 2.) With the valve close to you and the actuator away, Position 1 falls to the right of or clockwise from the common port(s). The SD rotor has one flow passage appearing as an engraved ring around the seal, which intersects the common port(s). A flow passages perpendicular to the ring connect the ring to the selected port. On ST and STF rotors, the ring is broken into two arcs, each with a perpendicular passage at the end.

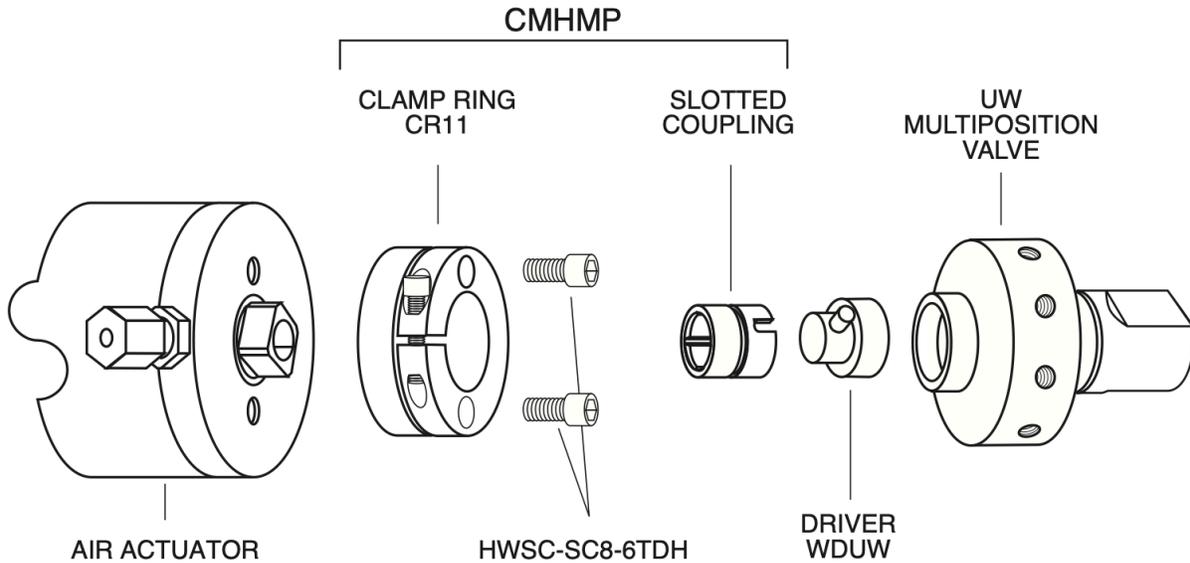
**FIGURE 2: Typical multi-position valve bodies and seals**



**FIGURE 3: Standoff assembly connecting actuator and valve**



**FIGURE 4: Closemount assembly connecting actuator and valve**



Basically, this alignment procedure is a way of centering the perpendicular engraving on the selected port by determining the point at which flow begins (when the engraving is just beginning to intersect the port) and the point at which flow ends (when the engraving has ceased to intersect the port), and centering the rotor between those two points.

1. Determine that the actuator is in Position 1, but then if necessary override or disable the means of pulsing the air to the actuator so that pressure is continuously applied to the actuator port nearest the valve.
2. Place the valve or valve and standoff combination on the actuator. By convention, one of the common ports goes at 12 o'clock, but the valve may be oriented according to your preference or convenience.

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 clamp ring screw 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 closemount valve, make sure that the ends of the pin in the rotor are engaged by the slots of the coupling. Tighten the screw in the clamp ring 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.

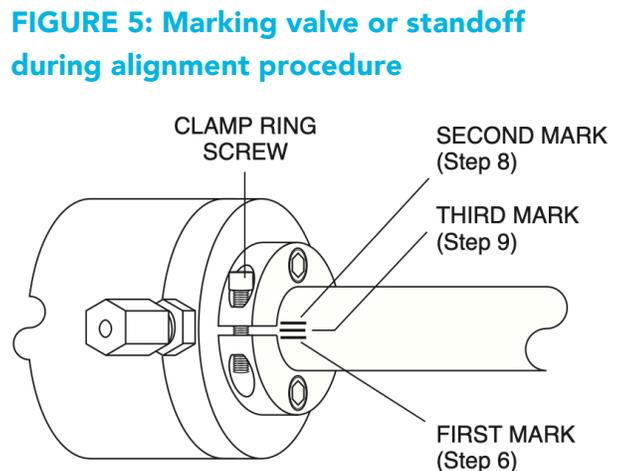
3. Establish a flow of clean gas (50 psi is adequate) into the alignment inlet designated in **Figure 2**.
4. With the valve toward you and the actuator away, the port to the right of or clockwise from the common port corresponds to Position 1.

Grip the valve and rotate it counterclockwise until gas flows from the port to the left of the common port at 12 o'clock. (This may require only a few degrees of rotation or nearly a full revolution: the design of the air actuator does not allow the valve to be turned either way while the rotor is held, as the electric actuator does.)

This sets up a "staging area" for the approach to Position 1.

**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.

5. Continue a slow counterclockwise rotation until the first traces of flow are heard from the port of Position 1, to the right of the alignment inlet.
6. 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 closemount valve, make this mark on the valve body (**Figure 5**).
7. Continue the slow manual counter clockwise rotation of the valve body through the point of peak flow and on until the flow stops or is barely audible, as in Step 5.
8. Make another mark as in Step 6 (**Figure 5**).
9. Make a third pencil mark between the first two and rotate the valve clockwise until this midway mark is reached (**Figure 5**).
10. While holding the valve steady, firmly tighten the clamp ring screw. The rotor should be properly positioned at the point of maximum flow when the actuator is stepped to the next position.



**FIGURE 5: Marking valve or standoff during alignment procedure**

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. If it is a valve which has a relatively short distance from the bottom of the detail to the internal taper, the engraved "dimples" on the seal are visible as they come into alignment with the port.

**FIGURE 6: UW type multi-position valve port conventions and schematic flow diagrams**  
*Port designations for Positions 1 and 2 are applicable to multi-position valves on air actuators only.*

