

MULTIPOSITION STANDARD ELECTRIC ACTUATOR

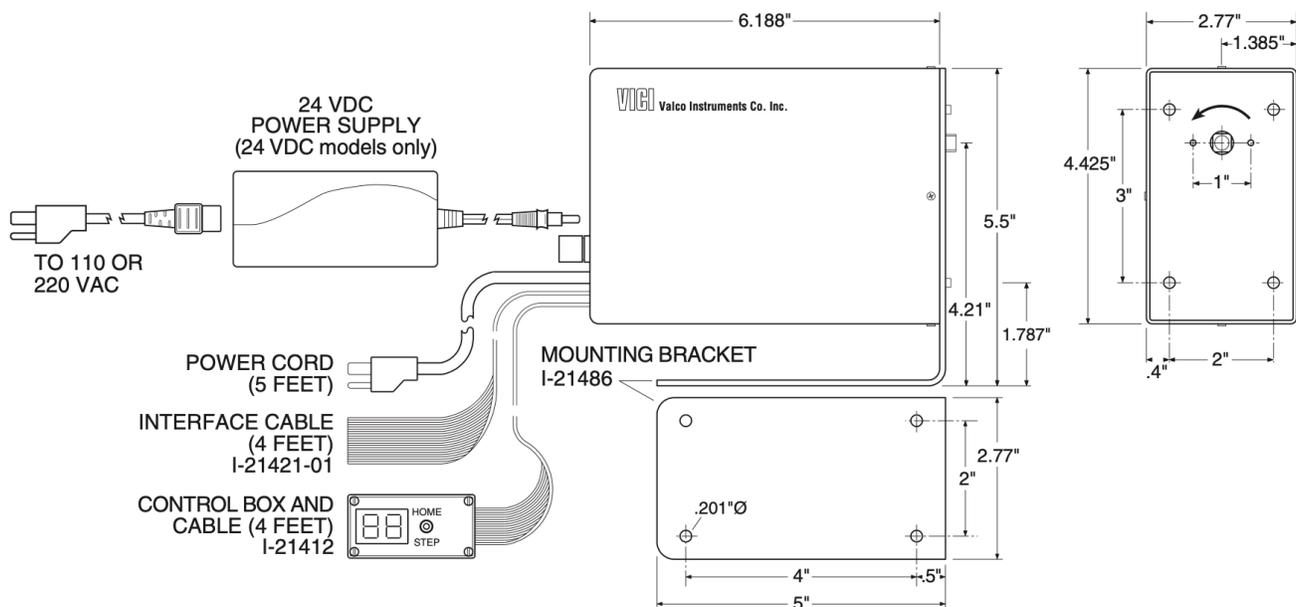
Technical Note 418

VICI Valco® and Cheminert® multiposition valves are widely used in a variety of applications including stream selection, trapping, and column switching. The valves can be switched manually, with an air actuator, with a standard electric actuator, or with a microelectric actuator. The multiposition standard electric actuator is the ideal choice if you wish to automate valve switching with contact closure and don't require the additional features of the microelectric actuator (i.e., automatic alignment, RS-232, compact size).

Actuators are available in 110 VAC, 220 VAC, and 24 VDC models for any 4, 6, 8, 10, 12, or 16 position valve. The model numbers of the actuators are respectively E4, E6, E8, E10, E12, and E16. (Add -220 for 220 VAC models and -24VDC for 24 VDC models.) A standard electric actuator can replace an existing air actuator, and is compatible with most Valco and Cheminert close mount and standoff as-sembly hardware.

The actuator consists of (a) the motor assembly, (b) a control box with LED display, and (c) a 20-conductor interface cable for remote switching. An actuator typically takes four seconds to complete 360°; that is, a 4 position valve takes one second to move the 90° from Position 1 to Position 2. All standard electric actuator models use separate line voltages and therefore require no power from the chromatograph with which they are used.

FIGURE 1: Actuator mounting dimensions



MANUAL USE OF THE MULTIPOSITION VALVE ACTUATOR

1. Plug the electric actuator into a power outlet (110 VAC or 220 VAC, 50/60 Hz, as required). The LED indicator in the control box (**Figure 1**) will display the position of the valve/actuator.
2. Press the control box toggle switch momentarily toward **HOME**. If the valve is in any position other than Position 1, it will go to HOME (Position 1). If the valve is in Position 1, it will not move.

As the valve moves toward HOME it sequences through each position, allowing the possibility that sample may flow briefly as each position is reached. Care must be taken to prevent possible sample loss or contamination.

3. Move the toggle switch momentarily toward **STEP** and the valve will advance from Position 1 to Position 2. If the switch is moved toward **STEP** again, the valve will move from Position 2 to Position 3.

CONTROLLING THE ACTUATOR WITH A COMPUTER

The first step in interfacing the Valco Multiposition Electric Actuator to a computer or data system is to consult the user manual of the control device to determine what kind of outputs are available, and how many there are. There may be relays, open collector transistors, logic level signal outputs, or an RS-232 connector.

The second step is to determine how the valve is to be moved. The simplest implementation is for the control device to duplicate the **STEP** and **HOME** commands of the control box. The other option is to access the positions randomly via BCD-encoded logic level signals. In this mode, the actuator passes through each intermediate position, stopping when it reaches the encoded position. In either case, as the valve sequences through each position it is possible that sample may flow briefly as each position is reached.

STEP AND HOME COMMANDS

Figure 4 (next page) specifies the functions of the different wires in the interface cable. All of the inputs are held at five volts, called "logic high". When they contact ground, the voltage drop signals the logic circuits in the actuator to direct the motor to the appropriate point.

Locate the violet wire for HOME, the gray wire for STEP, and the white wire for GROUND. After stripping a small amount of insulation from each of the wires, touch the gray wire to the white wire and observe that the actuator advances one position. Touching the violet wire to the white wire causes the actuator to rotate all the way around to Position 1, or HOME. (If the actuator is already in Position 1, nothing happens.) The contact closure must be maintained for at least 0.2 seconds to be recognized as valid.

These steps demonstrate the goal; that is, getting the control device to emulate the action of touching the wires together. Nothing else, such as applying a voltage to one of the wires, is involved. For relays or open collector transistors, which are essentially switches, connect the three wires to the proper terminals as indicated by the manual for the control device (**Figures 2 and 3**).

FIGURE 2: Relay connections

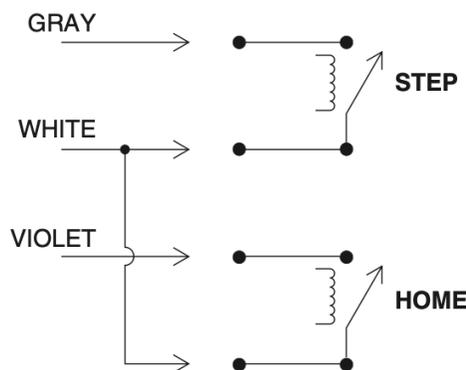


FIGURE 3: Open collector transistor connections

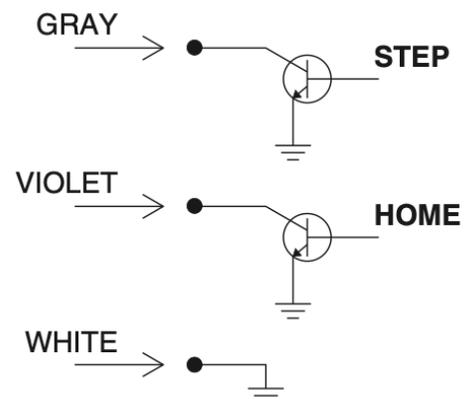
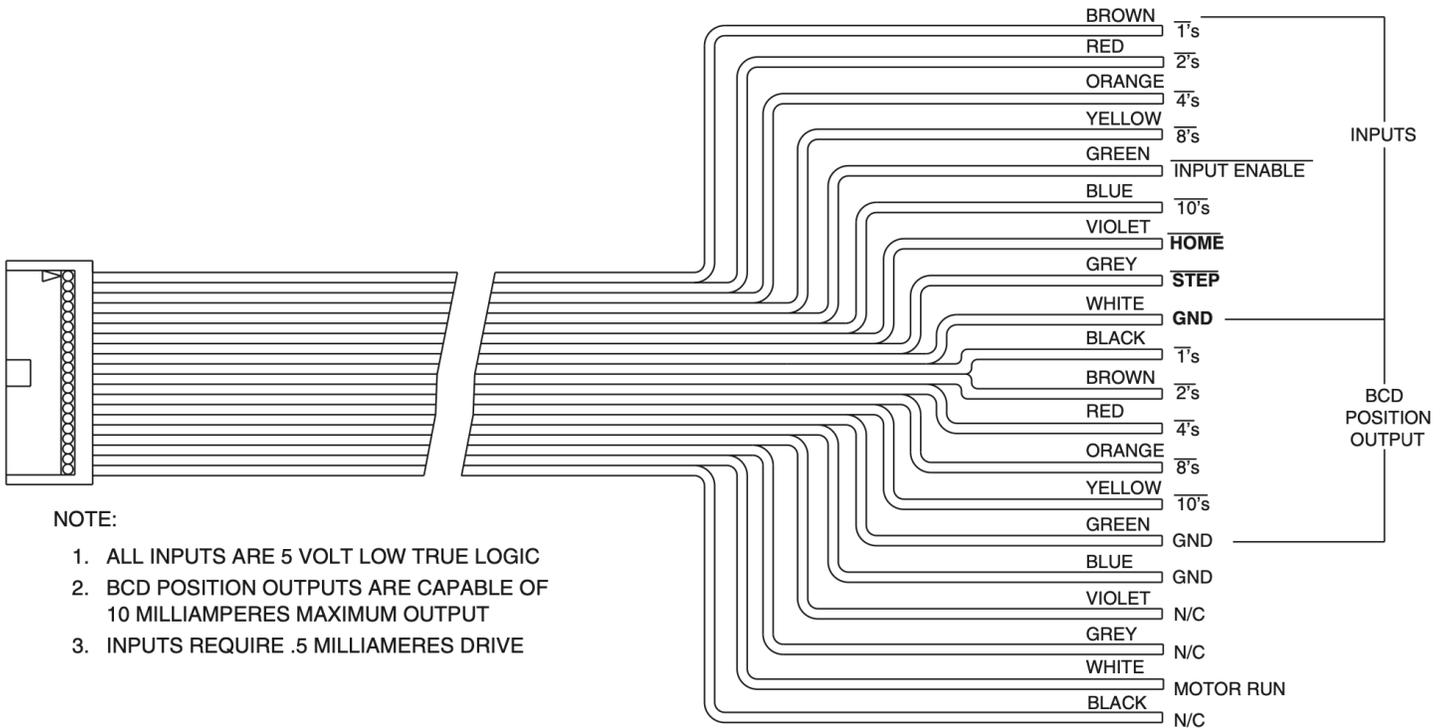


FIGURE 3: Interface cable functions



NOTE:

1. ALL INPUTS ARE 5 VOLT LOW TRUE LOGIC
2. BCD POSITION OUTPUTS ARE CAPABLE OF 10 MILLIAMPERES MAXIMUM OUTPUT
3. INPUTS REQUIRE .5 MILLIAMERES DRIVE

LOGIC INPUT

The Multiposition Electric Actuator is capable of specific position input control using a Binary Coded Decimal (BCD) scheme. For an in-depth discussion of BCD, refer to the Multiposition Electric Actuator Instruction Manual in the support section of our website at www.vici.com.

LOGIC OUTPUT

Some computers and devices have actual BCD logic inputs and outputs, with the binary coded combinations generated by software. This allows a relatively straightforward setup, but matching the logic sense between the actuator and computer is critical. If the computer requires a high true logic, or if other alterations must be made to the actuator, refer to the Multiposition Electric Actuator Instruction Manual for detailed instructions and schematics. The manual can be found in the support section of our website at www.vici.com.

ERROR SIGNALING

A flashing display indicates that errors or faults have been detected by the actuator logic. The display goes off briefly once, twice, or three times, followed by a pause before the cycle repeats.

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|----------------------|--|
| One flash | Internal failure of the microcontroller. |
| Two flashes | Invalid BCD position input: the position cannot be found on the encoder disk. Clear by entering STEP, HOME, or a valid position. |
| Three flashes | Motor failure, overheating, or excessive load on the actuator. |

ACTUATOR MODIFICATIONS

If the actuator requires modifications, such as a change in the number of positions indexed or a reversal of the direction of rotation, please refer to the instructions and schematics contained in the Multiposition Electric Actuator Instruction Manual in the support section of our website at www.vici.com.

FURTHER REFERENCE

Our website contains a wealth of technical information about actuators, valves, fittings, and everything else Valco makes. If you have questions not answered in this technical note, please refer to the support section of www.vici.com, which contains technical notes, instruction manuals, and application notes. The following are of particular interest to users of the Multiposition Standard Electric Actuator:

For valve alignment instructions:

Technical Note 702: Alignment Instructions for Electrically Actuated P Type Valves

Technical Note 706: Alignment Instructions for Electrically Actuated UW Type Valves

Technical Note 708: Alignment Instructions for Electrically Actuated MW Type Valves

For valve installation instructions, actuator modification instructions, and technical drawings:

Multiposition Electric Actuator Instruction Manual