



SEI & SEH

INSTALLATION INSTRUCTIONS

SEI 0.5 - 11



SEH



SEI



STEP MOTOR EXPANSION VALVES

OPERATION

The **SEI** and **SEH** series valves are step motor operated electric expansion valves. Step motors are designed to provide discrete segments of angular motion, or rotation, in response to an electronically generated signal. The advantages of step motors in valve applications are high resolution, repeatability and reliability with low hysteresis. Feedback loops are not required, simplifying controller design and circuitry.

The step motor used in the **SEI** and **SEH** valves is a 12-volt DC, two-phase, bi-polar, permanent magnet rotor type. Motor rotation is converted to linear motion by the use of a lead screw and threaded drive coupling. Forward motion of the motor extends the drive coupling and pin, which moves the valve to the closed position. Backward rotation of the motor retracts the drive coupling and pin modulating the valve in the opening direction. Full forward or backward travel, while the valve is assembled, is limited by the valve seat in the closed position or by the controller in the open direction. A slight clicking sound may be heard when overdriving closed and does no harm to the valve or drive mechanism.

The valve will operate only when connected to a properly designed controller. The controller must supply the necessary square wave step signal at 12 volts DC and 200 PPS, or a properly configured current limited signal up to 400 PPS, for the valve to control properly. Various Sporlan and third party controllers are available for use with the valve. Questions of suitability of a specific controller should be directed to Sporlan, Division of Parker, Attn.: Product Manager - Electric Valves. Control algorithms for the valve include a initialization sequence that will first over-drive the valve in the closing

direction. This is to assure that the valve is completely shut and to establish the “zero” open position. The controller then keeps track of the valve’s position for normal operation. During this initialization phase, a light clicking sound may be heard, which will serve as proof of the valve’s operation and closure.

All valves are tight seating and uniquely characterized by pin and port combinations for exceptional control of refrigerant flow. The seats require no service and are not replaceable. The motor may be easily replaced without removing the valve body from the system.

INSTALLATION

The SE series valves are electronically controlled Step Motor Expansion Valves, and are installed before the distributor and evaporator just as one would install a Thermostatic Expansion Valve. The valves are directional, and the inlet is clearly marked. Location should be planned to provide serviceability and to allow controller installation within a cable length of forty feet. The valve may be installed in the refrigerated space and may be mounted in any position except with the motor housing below horizontal. Cable routing should avoid any sharp edges or other sources of potential physical damage such as defrost heaters and fan blades. For neatness and protection, the cable may be fastened to the suction or liquid lines with nylon wire ties.

The valves have copper connections and any suitable solder or brazing alloy may be used to install the valve. There is no need to disassemble the valve for installation, however, the torch flame should be directed away from the motor housing and cable. Care must be taken to assure that the cable is not

damaged either directly from the flame, or indirectly from contact with hot piping. The valve is shipped in the open position to prevent heat being conducted into the motor, but it is strongly suggested that the valve body be wrapped with a wet cloth during the soldering operation. Inlet strainers are supplied optionally with ODF style valves, and if used, should be oriented in the proper direction as shown on the strainer package. The valve should be completely installed and reassembled before connecting to the controller and applying power. The wiring is color-coded and the controller manufacturer should be consulted for the proper attachment to the controller.

FIELD SERVICING INSTRUCTIONS

SEI & SEH Only

The following steps are necessary for the proper disassembly, inspection, cleaning and reassembly of all valves (whether in or out of the refrigerant piping).

1. Before disassembling the valve, be sure the refrigerant pressure in the system has been reduced to a safe level (0 psig).
 2. Disconnect the line voltage to the valve controller.
 3. Refer to the exploded view of the **SEI/SEH** for the remaining instructions. Using the appropriate wrenches or a vice to properly support the valve body, remove the motor assembly from the valve body by loosening the lock nut. **To prevent permanent damage to the motor, DO NOT attempt to disassemble the motor housing.**
- CAUTION: Regardless of whether the valve is in the system or in a vise, care must be taken to prevent distorting the valve parts when tightening.**
4. The motor assembly may be removed for inspection and cleaning.
 5. If the motor fails to operate properly, check the resistance of each motor phase. Resistance between the black and white leads or between the red and green leads should be as shown in Table 1. Differences of more than 10% between phases indicate a defective motor. Resistance between black and red, or any lead and housing should be infinite, any resistance reading will indicate a shorted winding and the motor will need to be replaced.

6. If you have access to a SMA test instrument, operation of the valve may be proven. Connect the motor leads to the proper color-coded connector on the SMA. Set the rate to 200 PPS and toggle in the "OPEN" direction. The white driver/piston should retract into the driver guide/adaptor. After approximately 30 seconds, the driver should be fully retracted and a light clicking or "ratcheting" sound may be heard, this is normal to the valves and proves operation of the motor. If the SMA is toggled in the "CLOSE" position, after approximately 30 seconds the white polyester driver/piston should disengage the lead screw, and can be removed. Inspect the driver/piston for damage. To replace the driver, toggle the SMA to the "OPEN" position and carefully engage the driver to the lead screw.

CAUTION: Whenever the motor is powered while not in place on the valve, the driver must be fully retracted into the guide before the valve is reassembled. Failure to do this will permanently damage the valve.

7. If the motor responds to step 6 above, the valve body itself should be checked for obstruction. Check for contaminants in the port or strainer, if used.
8. If the valve body and strainer are clear and the motor operates as in step 6 above, the valve is considered operational and the problem lies in the controller or power supply. The manufacturer of these components should be contacted for further assistance.

MOTOR ADAPTOR ASSEMBLY REPLACEMENT

SEI-30, -50 & SEH Only

If the motor is found to be defective in the above, the entire motor assembly must be replaced.

1. Remove all power from the valve and controller.
2. Cut the existing valve cable at a convenient point at the driest or most protected location.
3. Splice the new cable to the old cable using the waterproof butt splices. **COLOR CODING ON THE INDIVIDUAL WIRES MUST BE MATCHED; FAILURE TO DO SO WILL RENDER THE VALVE INOPERATIVE AND MAY DAMAGE EITHER THE VALVE OR CONTROLLER.**
4. Waterproof the splice with shrink tube or electrical tape suitable for use in cold and damp environments. Care should be taken to prevent the splice from lying in the case pan or other wet location.

VALVE REPLACEMENT

The entire valve may be replaced if desired. The old valve may be unbrazed or cut out of the piping. If analysis is required, the valve should be cut out to avoid overheating the motor assembly. If cut out, use a tubing or pipe cutter and not a saw. When installing the new valve any suitable brazing alloy and method may be used. The valve need not be disassembled, but the body and motor assembly should be wrapped with a wet cloth to prevent damage.

Extra care should be taken to prevent damage to the motor cable, either directly from the torch, or indirectly from contact with a hot surface.

Waterproof butt splices are not supplied with complete valves but must be used to prevent corrosion on the motor leads. Refer to the instruction for MOTOR REPLACEMENT above.

If the valve is disassembled for installation, refer to REASSEMBLY instructions, below.

REASSEMBLY

1. Use the SMA in the "OPEN" mode or valve controller to retract the white driver/piston fully into the driver guide. Remove power from the valve or controller.
2. Lightly oil the gasket or knife-edge on the new motor adaptor. Carefully seat the adaptor on the valve body or engage and tighten the lock nut if used. Lock nuts should be torqued to approximately 45 ft.-lbs. One eighth turn more than hand tight is sufficient to achieve a leak proof seal on knife edge joints. Loctite 242 should be applied to the threads on the SEI-0.5 through SEI-30. The motor kit should be attached to the valve, then tightened using a strap wrench ensuring the o-ring is fully compressed.
3. Pressurize the system and check for leaks.
4. Reapply power to the controller. Each controller manufacturer has a slightly different initialization scheme and the proper procedure must be followed. Since, during service, valve position as calculated by the controller will be lost, the controller should be initialized at least twice. In some instances, cycling power to the controller will accomplish this. However, the controller literature or the manufacturer should be consulted.

SMA-12 VDC BIPOLAR STEP MOTOR ACTUATOR

1. Connect any Sporlan step motor valve to the SMA-12 by matching wire color to terminal color. Any 12 VDC bipolar step motor may be tested with the SMA-12. Phase one leads should be connected to the black and white terminals, Phase two leads should be connected to the red and green terminals.
2. Select a step rate with the selector knob.
3. Push the open/close toggle switch in the "CLOSE" direction to extend the driver or close the valve.
4. Push the open/close toggle in either direction at the 1 step rate will alternate the phases energized.

5. Observe the terminal indicator lights. At rates other than 1, indicator lights will flash quickly. Pushing the open/close toggle in either direction at the 1 step rate will alternate the phases energized.

The following sequence of indicator lights will light.

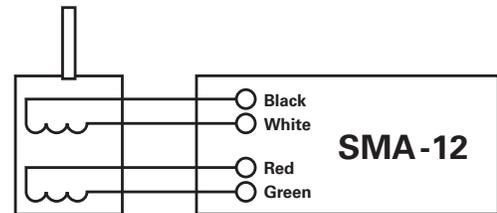
OPENING	CLOSING
Black & Red	Red & White
Red & White	Red & Black
White & Green	Black & Green
Green & Black	Green & White

6. Check that the power indicator light is lit; if not, replace the batteries.
7. If the terminal indicator lights do not light, one or both motor phases are open and the motor must be replaced.
8. If the motor can be powered smoothly in both directions, the motor assembly is functional and the controller must be tested or replaced.

SMA SPECIFICATIONS

Power input – Two 9 volt Alkaline batteries
 Power output – 10 Watts intermittent
 Step rate – Selectable - 1, 50, 100, 200 steps per second
 Drive type – Bipolar
 Connector – Binding post with banana plug socket

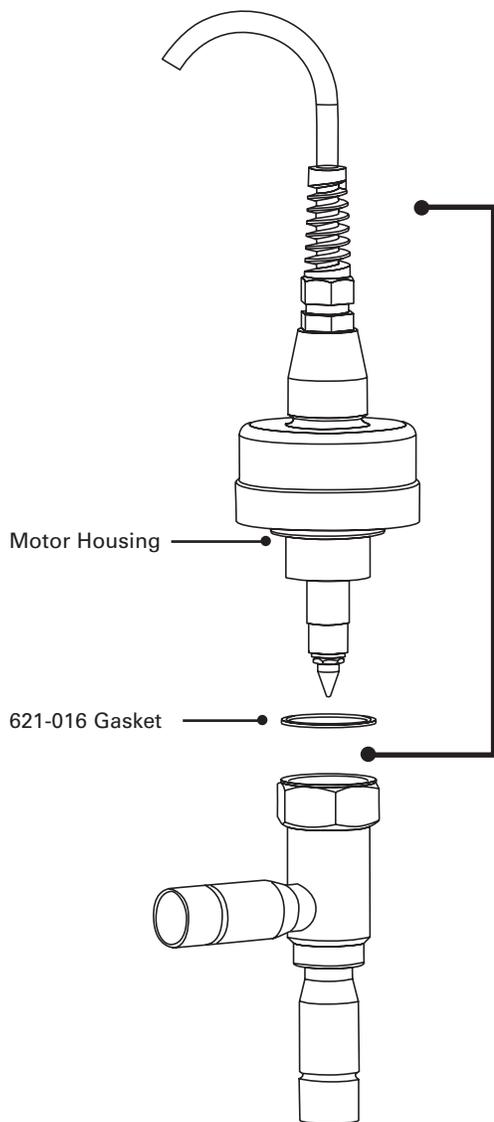
12 Volt DC Bipolar Step Motor



An accessory pigtail item number 958112 is available at extra charge to allow the SMA-12 to be directly connected to all Sporlan Packard Weather-Pack™ equipped valves.

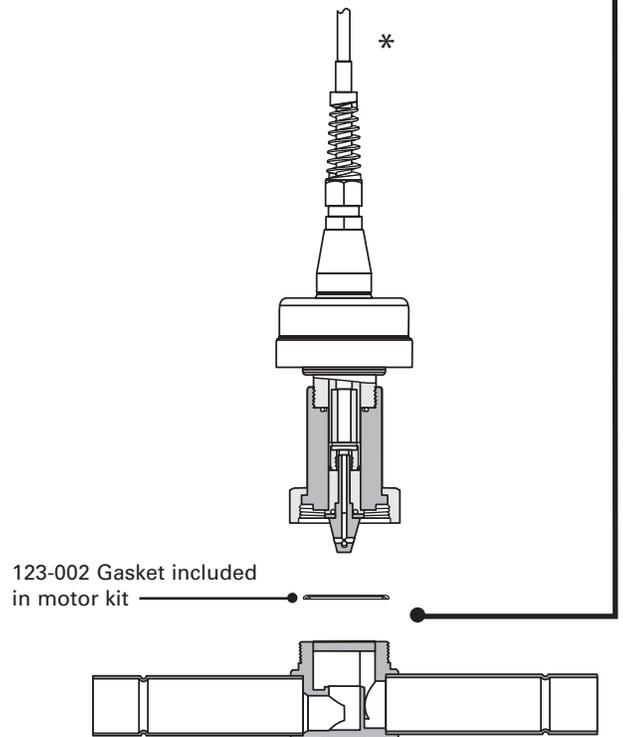
Table 1

Valve Model	Motor Kit	Gasket	Motor Phase Resistance Ohms	Number of Steps
SEI .5 to 11	Not available	0621-016	75 ± 10%	1596
SEI-30	KS-SEI-30	0621-016	75 ± 10%	3193
SEI-50	KS-SEI-50	0123-002	75 ± 10%	6386
SEH(I) 100 and 175	KS-SEH100/175	None required	75 ± 10%	6386

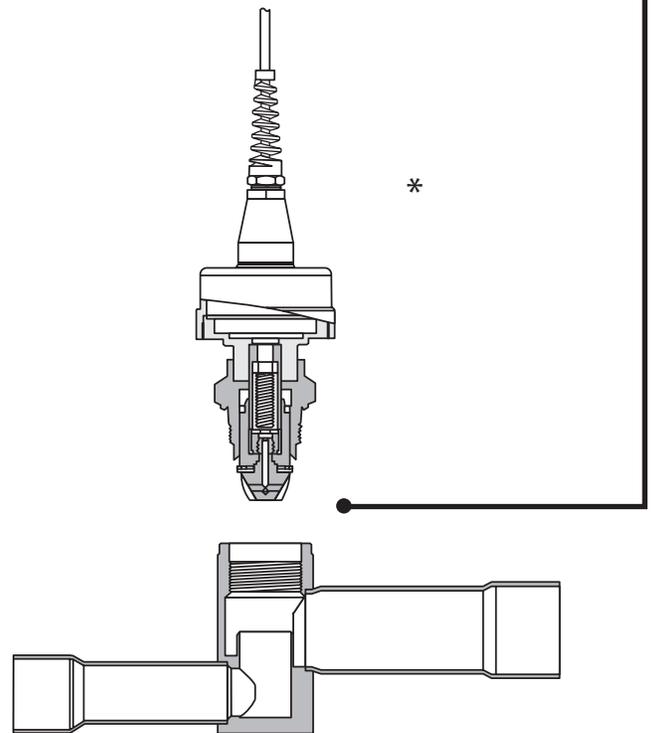


SEI-0.5 to SEI-30 Motor Assembly

SEI-50 Motor and Adapter Assembly



SEH Motor and Adapter Assembly



* Motor kits supplied with 24" lead wire with butt splice connectors.