Operating Instructions
Model 7125
Manual Sample Injector

1.0 DESCRIPTION

Model 7125 is a six-port sample injection valve in which the sample is loaded through a built-in needle port in the front of the valve.

Figure 1 shows the flow diagram of the valve. The circles represent the ports in the valve stator. The dark and white grooves represent the connecting passages in the rotor seal. The large circle represents the needle port.

The sample loop is loaded through the needle port in the LOAD position. Rotation of the knob 60° switches the valve from LOAD to INJECT. In INJECT the mobile phase flows through the loop.

2.0 SUPPLIED WITH THE VALVE

Supplied with the valve in a separate bag are RheFlex® fitting sets for all ports and the items shown below. A 20 µL sample loop is standard with the valve.

- Hex Keys
- Needle Port Cleaner
- Mounting Screws
- Vent Tubes

The #22 gauge needle supplied in the valve should be removed from the needle port before using the valve.

3.0 SPECIFICATIONS

- Maximum Temperature: 80°C
- Maximum Operating Pressure: 48 MPa (482 bar, 7000 psi)
- Flow Passage Diameters: 0.6 mm (0.024") and 0.5 mm (0.018")
- Wetted Surfaces: stainless steel, ceramic, and an inert polymer

4.0 IMPORTANT SAFETY NOTICES

4.1 Warning: When using sample loops larger than 100 µL, shield yourself from mobile phase coming out of the needle port when the valve is turned from INJECT to LOAD. Example: 1 mL loop ejects 20 µL upon decompression from 19 MPa (200 bar, 2898 psi).

4.2 Warning: When using the Needle Port Cleaner, empty the syringe slowly to prevent solvent from squirting back at you.

4.3 Caution: Rinse the valve with water after using buffer solutions to prevent crystals from forming, which can cause scratches on the rotor seal.

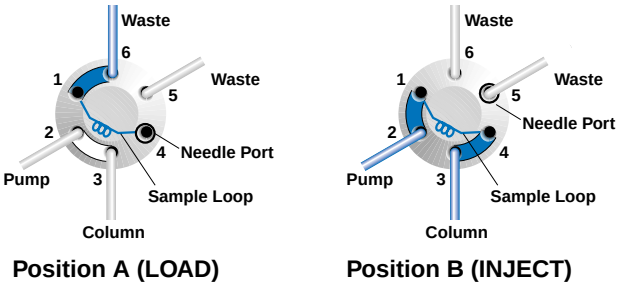

Fig. 1. Model 7125 flow diagram.

5.0 USING PROPER SYRINGES

Use syringes with #22 gauge syringe needle, without electro taper and with 90° point style (square cut). Using the incorrect needle size will damage the injector.

6.0 INSTALLATION

a) To mount the valve on a panel, remove the handle by loosening the two handle set screws. Use the two screws supplied to fasten the valve to a panel.

b) Replace the handle by tightening the two set screws on the two flats of the shaft.

c) Connect the two vent tubes (supplied) to Ports 5 and 6. Place the outlet ends of both at the same horizontal level as that of the needle port to avoid siphoning. See Figure 2.

d) Connect the pump to Port 2 and the column line to Port 3. Leave the column disconnected from the valve during initial flushing.

7.0 FLUSHING THE INJECTOR

In INJECT, flush the needle port with 1 mL of mobile phase, using the Needle Port Cleaner as shown in Figure 3. At this time, the pump flushes the loop. See **Warning 4.2**.

8.0 MAKING AN INJECTION

There are two common methods of loading the sample loop – complete or partial filling.

8.1 COMPLETE LOOP FILLING

In complete-filling, the volume of sample

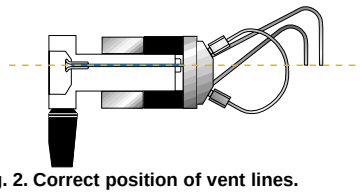

Fig. 2. Correct position of vent lines.

injected is set by the volume of the loop (this includes the valve passages). This method produces the highest precision.

Overfill the loop with at least two to five

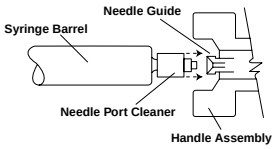

Fig. 3. Use of Needle Port Cleaner.

loop volumes of sample. Six to ten loop volumes will provide even better precision. An excess of sample is needed because mobile phase near the wall of the loop is displaced slowly due to the laminar flow effect shown in Figure 4.

To completely fill the loop:

a) See **Warning 4.1** and turn to LOAD.

b) Insert the syringe into the needle port. You will feel tightness during the last 2-3 mm of travel as the needle passes through the needle seal and then stops against the stator face.

c) Load the sample.

d) Leave the syringe in and turn to INJECT.

8.2 PARTIAL LOOP FILLING

If you only have small quantities of sample, this is the method of choice. In the partial-filling method the volume of sample injected

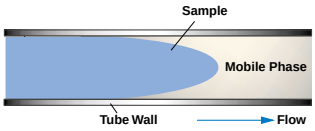

Fig. 4. Laminar flow effect.

is set by the syringe. In this method, no more than half a loop volume of sample should be loaded into the loop. For example, load no more than 10 µL into a 20 µL loop. With larger volumes some of the sample is lost out Vent Line 6. This is because sample flows down the center of the loop at twice the average velocity due to the laminar flow effect shown in Figure 4.

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To partially load the loop:

a) In INJECT, use the Needle Port Cleaner to flush out the needle port with about 1 mL of mobile phase. This will flush out contamination from the earlier injection. This liquid will exit out Vent Line 5.

b) Follow steps **a-d** in Section 8.1.

9.0 ADJUSTING FOR LEAKAGE OR HIGHER PRESSURE OPERATION

The three small set screws in the stator (see Figure 5) have been factory set so that when the three stator screws are fully tightened, the spring force between the valve rotor and stator is sufficient to hold the indicated pressure. If leakage is to be corrected, or if operation at a higher pressure is to be done, proceed as follows: The three set screws should be loosened about 1/20 turn each (18° of rotation) and the three stator screws tightened an equal amount. If this new setting fails to accomplish leak-free operation at the desired pressure, repeat the procedure by an additional 1/20 turn. Avoid excessive tightening which will only increase wear of the rotor seal. If it is necessary to loosen spring tension, either to lower the operating pressure, or to adjust for a new rotor seal, which may be thicker than the one being replaced, reverse the above procedures. For example, first loosen the stator screws, then tighten the set screws.

If leakage cannot be stopped by tightening the valve, or if, as a result of tightening to stop the leakage, the handle is too hard to turn, the rotor seal needs replacing. See next section.

10.0 MAINTENANCE

The only parts that may need eventual replacement are the rotor seal and stator face assembly.

The main causes of early failure are:

a) The wrong needle tip can damage the ceramic stator face which then causes deep scratching of the rotor seal surface.

b) Abrasive particles in the sample can scratch the rotor seal surface.

10.1 DISASSEMBLY

To disassemble the valve, refer to Figure 5 and proceed as follows:

a) Remove the three stator screws.

b) Remove the stator, stator face assembly, and stator ring from body.

c) Pull the rotor seal off the pins.

d) Remove the isolation seal.

10.2 REASSEMBLY

To reassemble the valve, refer to Figures 5 and 6 and proceed as follows:

a) Slip the new isolation seal (open side facing the handle) onto the stator end of the shaft assembly next to the bearing ring.

b) Line up the rotor seal as shown in Figure 6. The rotor seal slots face the stator.

c) Replace the stator ring so that the 60° stop pins enter the mating holes in the stator ring.

d) Put the stator face assembly on the stator. The assembly is symmetrical and can be mounted either of two ways.

e) Replace the stator face assembly and stator on the valve so that the pin in the stator ring enters the mating hole in the stator.

f) Replace the three stator screws and tighten each screw a little at a time to keep the stator surface parallel to the stator ring surface. If the three set screws in the stator were left unchanged, tighten the three stator screws a 1/2 turn past fingertight. The three set screws will ensure that the gap between stator and stator ring is uniform and in the original position before disassembly.

g) If the set screws need adjusting because a new rotor seal was installed or because leakage has to be stopped, each set screw should be turned an equal amount to ensure that after the stator screws are retightened the gap between the stator and stator ring is uniform all around. Refer also to Section 9.0.

11.0 OPERATING SUGGESTIONS AND TROUBLESHOOTING

11.1 LEAKAGE

If you see liquid between the stator and stator ring, or from the needle port or a vent tube, tighten the pressure adjusting screw as explained in Section 9.0. If this fails to stop the leak then replace the rotor seal and/or stator face assembly.

11.2 NEEDLE SEAL LEAKAGE

Since the outside diameter of syringe needles can vary, the needle seal (Teflon[1] sleeve in the rotor seal) may not seal firmly around a needle that is smaller than average. This will result in the loss of accuracy in loading the sample. To make a good seal, remove the needle from the needle port and push in on the plastic needle guide with the eraser end of a pencil. Repeat if necessary.

11.3 USE OF AQUEOUS BUFFERS OR SALT SOLUTIONS

To prevent the formation of salt crystals in the valve which can scratch the rotor seal, flush out the flow passages and the needle port with water after using salt solutions.

11.4 USE OF HIGH pH SOLUTIONS

The standard rotor seal in Model 7125 is Vespel[1], a polyimide with good wear resistance. Vespel is sensitive to alkaline attack when exposed to solutions having a pH of 10 or more. Use a PEEK or Tefzel[1] rotor seal, which tolerates pH 0 to 14, for alkaline solutions.

11.5 ACCURACY OF SAMPLE LOOPS

Sample loop sizes are not actual values. The actual volume can differ by ± 10% for a 20 µL loop. There is a greater difference for smaller loops. Use partial-filling if you must know the actual volume injected.

12.0 RECOMMENDED SPARE PARTS

Rheodyne offers a RheBuild™ Kit for Model 7125 that includes all parts, tools, and instructions to maintain the quality performance of your valve without separate part ordering.

7125-999 RheBuild Kit for 7125

13.0 WARRANTY

All Rheodyne products are warranted against defects in materials and workmanship for a period of one year following the date of shipment by Rheodyne. Rheodyne will repair or replace any Rheodyne product that fails during the warranty period due to a defect in materials or workmanship at no charge to the customer. The product must be returned to Rheodyne's factory in original packaging or equivalent, transportation prepaid. Damage occurring in transit is not covered by the warranty. This limited warranty is Rheodyne's sole warranty of its products, and all other warranties of merchantability or fitness for any particular purpose are hereby disclaimed. Under no circumstances will Rheodyne be liable for any consequential or incidental damages attributable to a claimed failure of a Rheodyne product, even if Rheodyne has been placed on notice of possibility of such damages.

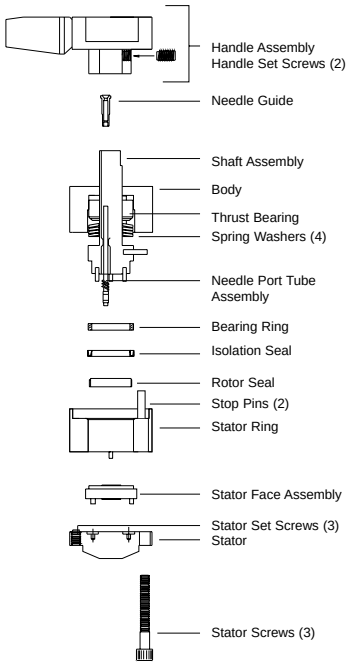

Fig. 5. Exploded view of Model 7125.

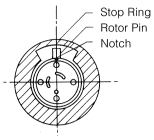

Fig. 6. Correct position of rotor seal (slots face the stator).

[1] Teflon, Vespel, and Tefzel are trademarks of E.I. DuPont

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