

Operating Instructions

Model 7125NS

Syringe Loading Sample Injector

1.0 DESCRIPTION

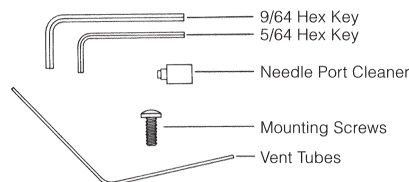
Model 7125NS is a six-port sample injection valve in which the sample is loaded through a built-in needle port in the front of the valve.

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 fitting sets for tubing connections and the items shown below. A 20 μ L sample loop is standard with the valve.



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: 0.4 mm (0.016") and 0.5 mm (0.018").
- Wetted Surfaces: stainless steel, alumina ceramic, and an inert polymer.

4.0 IMPORTANT SAFETY NOTICES

4.1 Warning: When using sample loops larger than 100 μ L, 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 μ L 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.

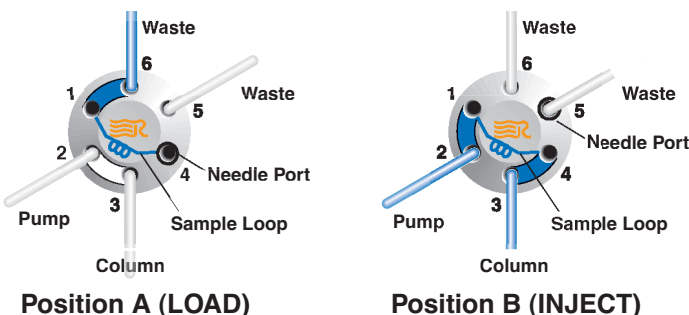


Fig.1. Model 7125NS flow diagram.

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.

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

- 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.
- Confirm that the handle protrusions are out of the slots in the body. Replace the handle by tightening the two set screws on the two flats of the shaft.
- 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.
- Connect the pump to Port 2 and the column line to Port 3. Leave the column disconnected from the valve during initial flushing.

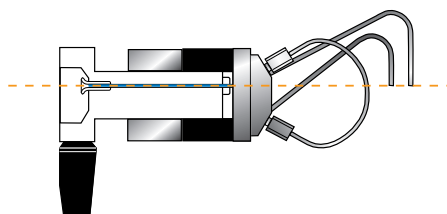


Fig. 2. Correct position of vent lines.

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**.

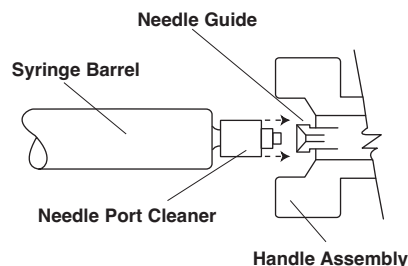


Fig. 3. Use of Needle Port Cleaner.

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 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 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:

- See **Warning 4.1** and turn to LOAD.
- 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.

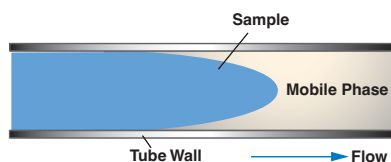


Fig. 4. Laminar flow effect.

- Load the sample.
- 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 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.

To partially load the loop:

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

9.0 ADJUSTING FOR LEAKAGE OR HIGHER PRESSURE OPERATION

There is a single pressure adjusting screw at the handle end of the valve body. The handle assembly is designed to be used as a tool for adjusting this screw. If you need operation up to a higher pressure or if there is a leak between the stator and stator ring, loosen the two set screws so that the handle slips down the shaft and the two protrusions fit into the slots on the adjusting screw. Tighten the adjusting screw about $\frac{1}{8}$ th turn. Use the 20 dial markings on the body and the painted spot on the adjusting screw as guides, see Figure 7. If there is still leakage at this new setting, repeat the process. Replace the rotor seal if the leak continues.

Note: When the valve is not panel mounted, the adjusting screw can be hard to turn. In this case, loosen the three stator screws $\frac{1}{4}$ turn prior to adjusting the screw. Retighten the stator screws before testing for leaks.

Replace the handle and tighten the two set screws on the two flats of the shaft. Confirm that the handle protrusions are out of the slots in the body before tightening the set screws. This step is important. If the handle engages the pressure adjusting screw the shaft will not rotate between LOAD and INJECT. See Figure 5.

Note: If the vent lines from Ports 5 and 6 do not have their outlet ends at the same horizontal level as the needle port, siphoning can result, which is often misinterpreted as a leak. A siphoning leak will stop when the vent lines and needle port tube are empty. A leak due to a damaged rotor seal will continue.

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:

- The wrong needle tip can chip the ceramic stator face which then causes deep scratching of the rotor seal surface.
- Abrasive particles in the sample can scratch the rotor seal surface.

Genuine IDEX Health & Science® parts are easily replaced by following the instructions.

10.1 DISASSEMBLY

To disassemble the valve, refer to Figure 6 and proceed as follows:

- Remove the three stator screws.
- Remove the stator, stator face assembly and stator ring from body.
- Put the rotor seal off the pins.
- Leave the isolation seal and bearing ring in place.

10.2 REASSEMBLY

To reassemble the valve, proceed as follows and refer to Figure 6.

- Line up the rotor seal as shown in Figure 8. The rotor seal slots face the stator.
- Replace the stator ring so that the pin in the 60° stop ring enters the mating hole in the stator ring.
- Put the stator face assembly on the stator. The three pins on the assembly fit into the mating holes in the stator only one way.
- Replace the stator and stator face assembly on the valve so that the pin in the stator ring enters the mating hole in the stator.
- Add the three stator screws. Tighten each screw a $\frac{1}{2}$ turn past fingertight.
- Replace the handle and tighten the two set screws on the two flats of the shaft. Confirm that the handle protrusions are out of the slots in the body before tightening the set screws. This step is important. If the handle engages the pressure adjusting screw the shaft will not rotate between LOAD and INJECT. See Figure 5.

10.3 POSITION SENSING SWITCH

The Position Sensing Switch is a magnetic reed switch actuated by a magnet sealed inside the shaft. The switch stays closed in the INJECT position. The switch is rated for 10 V at 10 mA.

To replace or remove the switch:

- Remove stator, stator ring, and stop ring.
- Pull the switch out of the stop ring.
- Replace with a new switch.
- Follow Section 10.2 to reassemble.

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 (PTFE sleeve in the rotor seal) may not seal correctly 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 7125NS is Vespel¹, 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 Tefzel¹ 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 $\pm 10\%$ for a 20 μL loop. There is a greater difference for smaller loops. Use partial-filling if you must know the actual volume injected.

13.0 WARRANTY

All IDEX Health & Science® products are warranted against defects in materials and workmanship for a period of one year following the date of shipment by IDEX Health & Science will repair or replace any IDEX Health & Science 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 IDEX Health & Science's factory in original packaging or equivalent, transportation prepaid. Damage occurring in transit is not covered by the warranty. This limited warranty is IDEX Health & Science'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 IDEX Health & Science be liable for any consequential or incidental damages attributable to a claimed failure of a IDEX Health & Science product, even if IDEX Health & Science has been placed on notice of possibility of such damages.

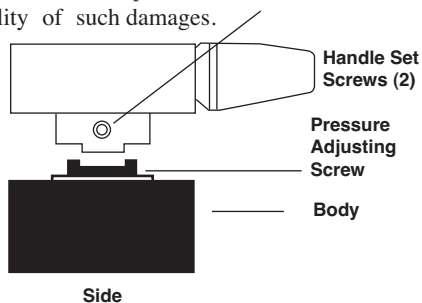


Fig. 5. Valve handle acting as wrench to adjust valve pressure adjusting screw.

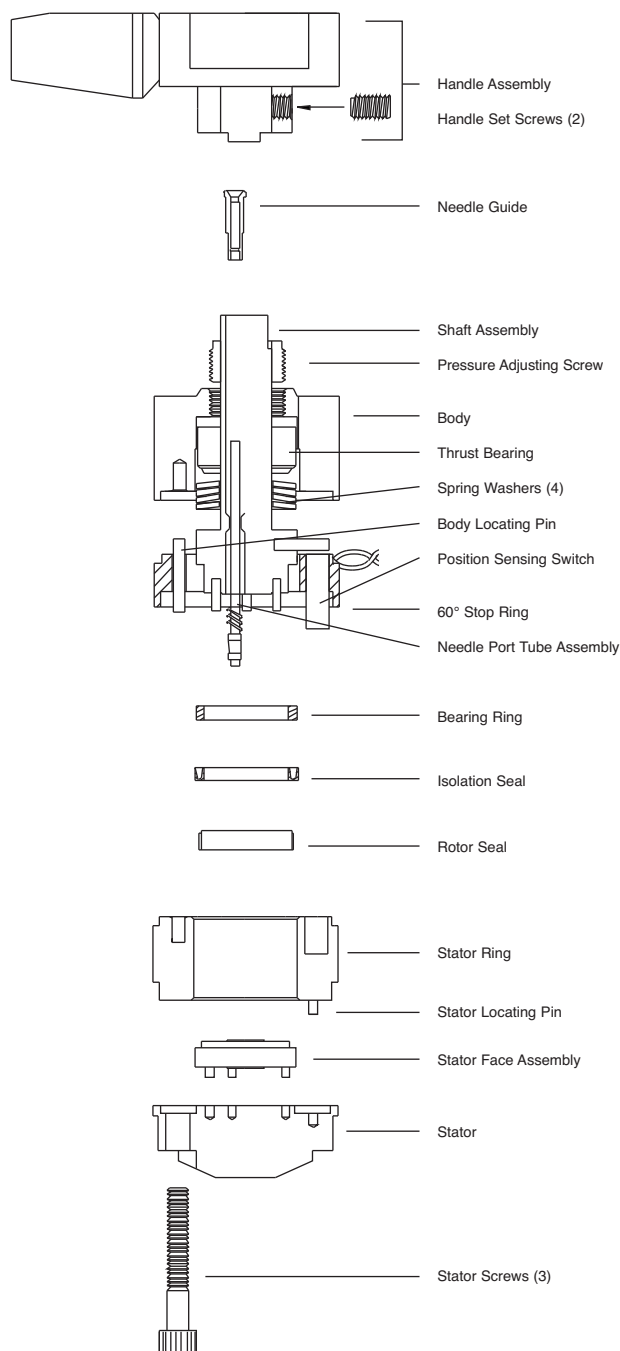


Fig. 6. Model 7125NS exploded view.

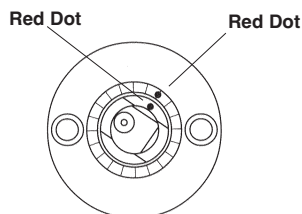


Fig. 7. Guides on adjusting screw and body.

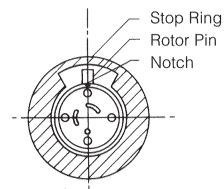


Fig. 8. Correct position of rotor seal (slots face the stator).

¹ Vespel and Tefzel are trademarks of E.I. DuPont