



Operating Instructions

Models 3710(i) and 3710(i)-038

Preparative Scale Manual Sample Injectors

1.0 DESCRIPTION

Models 3710(i) and 3710(i)-038 are six-port sample injection valves. The sample is loaded through an accessory injection port (P/N 3012 or 3013) in the back of the valve. Model 3710 is the PEEK version and Model 3710-038 is the stainless steel version. The "i" models have a built-in position sensing switch.

Figure 1 shows the flow diagram of the valves. The circles represent the ports in the valve stator. The dark and white grooves represent the connecting passages in the rotor seal. The dotted flow passage represents the Make-Before-Break (MBB™) valve design.

Figure 2 shows a detailed cut-away view of the MBB design.

The MBB valve architecture allows uninterrupted flow as the valve switches from LOAD to INJECT. The mobile phase continuously flows through both the rotor seal groove and the MBB passage until rotation stops. See Figures 1 and 2.

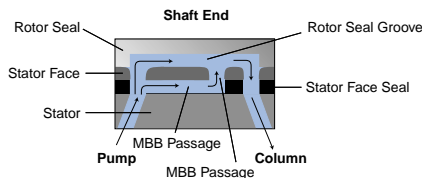


Fig. 2. Cut-away view of MBB design.

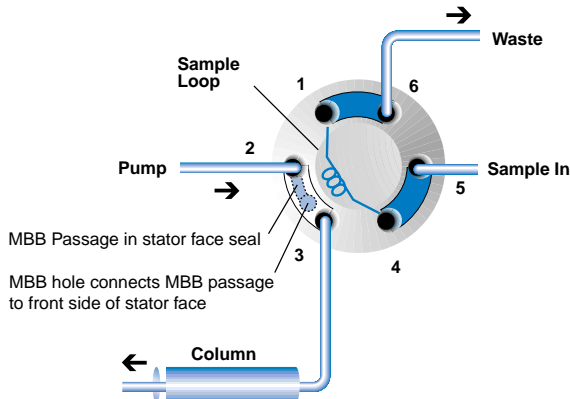
2.0 SUPPLIED WITH THE VALVE

Supplied in a separate bag are RheFlex® fittings sets for all ports and the following items. The standard 10 mL sample loop is supplied in a separate bag.

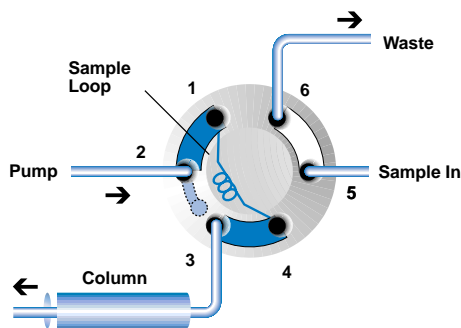
- 1/4-5/16 Wrench
- Hex Keys
- Mounting Screws

3.0 SPECIFICATIONS

- Maximum Operating Pressure: Model 3710(i) - 28 MPa (276 bar, 4000 psi); Model 3710(i)-038 - 34 MPa (345 bar, 5000 psi)
- Maximum Operating Temperature: 50°C
- Flow Passage Diameters: 1.0 mm (0.040")
- Wetted Surfaces: Model 3710(i) - PEEK; Model 3710(i)-038 - stainless steel and PEEK
- Built-in position sensing switch ("i" models only)
- Ports accept fittings for 1/8" OD tubing



Position 1 (LOAD)



Position 2 (INJECT)

Fig. 1. Models 3710(i) and 3710(i)-038 containing the patented MBB valve design.

4.0 IMPORTANT NOTICES

4.1 Warning: Shield yourself from mobile phase coming out of Ports 5 and 6 when the valve is turned from INJECT to LOAD.

4.2 Caution: Rinse the valve after using buffer solutions to prevent salt crystals from forming, which can scratch the rotor seal and stator face assembly.

4.3 Caution: Use only RheFlex PEEK fittings in the PEEK stator ports. Metal ferrules can cause irreparable damage to the PEEK stator.

4.4 Caution: To prevent stripping of the threads that accept the stator screws when reassembling the valve, loosen the pressure adjusting nut BEFORE tightening the stator screws.

5.0 INSTALLATION

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

b) Replace the handle assembly by tightening the two set screws into the hole on the shaft.

c) See **Caution 4.3**. Connect Port 5 to an accessory injection port and Port 6 to a vent line.

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

Note: Vent Line 6 should be the same horizontal level as the injection port to avoid siphoning.

6.0 OPERATION

Before connecting the column to the injector, flush the injector with mobile phase in both the LOAD and INJECT positions. After flushing the injector, turn to LOAD, and connect the column.

With the accessory injection port, you can load the injector by two methods: Complete-Filling and Suction Loading.

6.1 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 3.

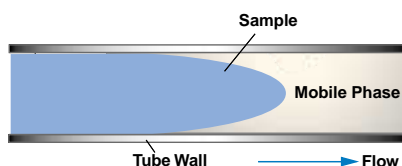


Fig. 3. Laminar flow effect.

To completely fill the loop:

- See **Warning 4.1** and turn to LOAD.
- Insert the syringe into the accessory injection port.
- Load the sample.
- Turn to INJECT.

6.2 SUCTION LOADING

The preceding method exposes the sample to the metal needle of the loading syringe. Metal can be completely avoided by using a syringe to suck sample into the loop. The steps are as follows:

- In LOAD, dip the tube attached to Port 6 into the sample.
- Insert an empty syringe into the injection port and suck up sample into the loop.
- Leave the syringe in position and turn to INJECT.

The metal needle of the syringe will contact the sample if an excess of sample is drawn into the syringe, but this excess sample is external to the sample loop and will not be injected. The syringe can be used many times before it needs to be emptied.

To load the loop with all of the available sample, the loop should be at least four times the volume of sample loaded. The loop is first filled with mobile phase via the dip tube, then the whole sample is drawn into the dip tube and loop, followed by more mobile phase. The sample is now sandwiched between two zones of mobile phase in the loop.

7.0 ADJUSTING FOR LEAKAGE OR HIGHER PRESSURE OPERATION

A single pressure adjusting nut at the handle end of the valve is used for pressure adjustment. If you need operation up to a higher pressure or if there is a leak between the stator and stator ring, remove the handle assembly by loosening the two handle set screws. This gives access to the pressure adjusting nut. Using a wrench, tighten the adjusting nut about 1/20th turn. Use the red dot and punch mark as guides.

If there is still leakage at this new setting, repeat the process. Finish by retightening the handle set screws into the hole on the shaft. Replace the rotor seal and stator face assembly if the leak continues.

Note: When the valve is not panel mounted the pressure adjusting nut can be hard to turn. In this case, loosen the three stator screws a 1/4 turn before adjusting the nut. Retighten the stator screws before testing for leaks.

Note: Vent Line 6 should be the same horizontal level as the injection port to avoid siphoning. A siphoning leak will stop when the vent line and sample loop are empty. A leak due to a damaged rotor seal will continue.

8.0 MAINTENANCE

The only parts that may need eventual replacement are the rotor seal and stator face assembly. Abrasive particles in the sample can damage the rotor seal and stator face assembly surfaces.

Genuine Rheodyne parts are easily replaced by following the instructions.

8.1 DISASSEMBLY

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

- Remove the handle assembly by loosening the two handle set screws.
- Remove the valve if mounted on a panel.
- Remove the three stator screws.
- Remove the stator, stator face assembly, and stator ring from the body.

- Pull the rotor seal off the pins.
- Leave the isolation seal and bearing ring in place.

8.2 REASSEMBLY

To reassemble the valve, refer to Figures 4 and 5 and proceed as follows:

- Line up the new rotor seal as shown in Figure 4. The rotor seal grooves face the stator.
- Push the new rotor seal onto the pins.
- Replace the stator ring so that the pin in the 60° stop ring enters the mating hole in the stator ring.
- Put the new 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.
- Replace the three stator screws. Tighten each screw a 1/2 turn past fingertight.
- If panel mounted, remount the valve onto the panel.
- Replace the handle assembly and tighten the two handle set screws into the hole on the shaft.

8.3 POSITION SENSING SWITCH

The position sensing switch is standard on “i” models only. The switch is a magnetic reed switch actuated by a magnet sealed inside the shaft. The switch is rated for 100 V at 200 mA.

To replace or remove the switch:

- Remove the three stator screws.
- Remove stator, stator ring, and stop ring.
- Pull the switch out of the stop ring.
- Replace with new switch, or leave the hole empty if the switch is not needed.
- Follow Section 8.2 to reassemble.

9.0 OPERATING SUGGESTIONS AND TROUBLESHOOTING

9.1 LEAKAGE

If you see liquid between the stator and stator ring leaking from at Port 5 and 6, tighten the pressure adjusting nut as explained in Section 7.0. Replace the rotor seal and stator face assembly if the leak continues.

9.2 USE OF AQUEOUS BUFFERS OR SALT SOLUTIONS

To prevent the formation of salt crystals in the valve, flush out the passages and the vent line with water after using salt solutions.

9.3 ACCURACY OF SAMPLE LOOPS

Sample loop sizes are not actual values. The actual volume can differ by $\pm 5\%$ for a 10 mL loop. There is a greater difference for smaller loops.

10.0 RECOMMENDED SPARE PARTS

Use genuine Rheodyne replacement spare parts to maintain the quality performance of your valve.

3710-008 PEEK Rotor Seal

3710-004 PEEK Stator Face Assembly

11.0 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.

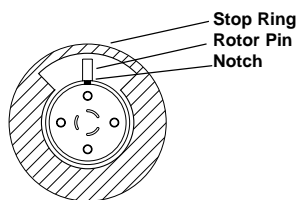


Fig. 4. Correct orientation of rotor seal (grooves face the stator).

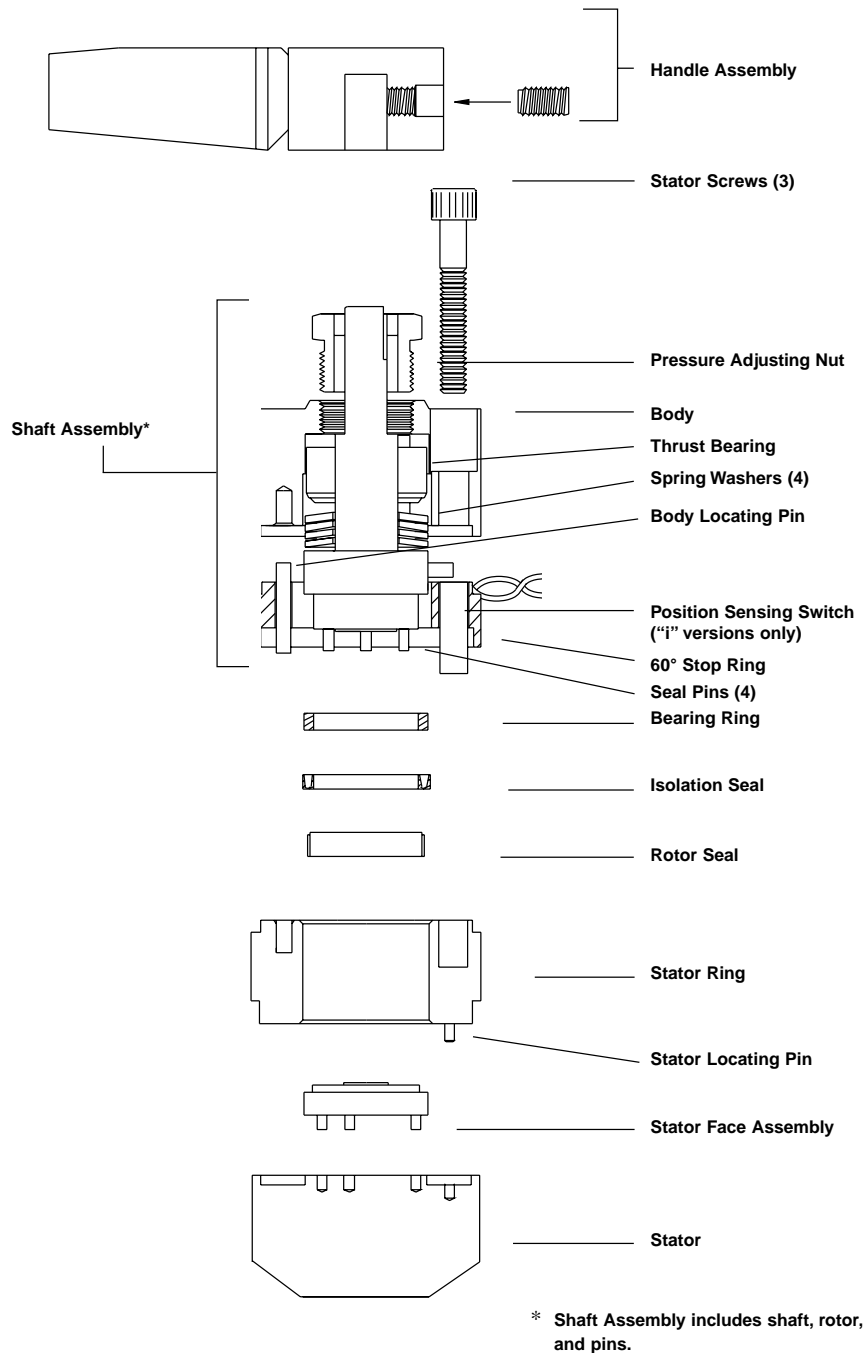


Fig. 5. Exploded view of 3710(i) and 3710(i)-038.