

Valve IV-7

The Valve IV-7 (Code No. 19-1996-01) is a 3-position, 7-port valve designed to be used as a sample injection valve or system valve. The central shaft can be rotated to connect various ports on the valve housing. There are 3 valve positions: LOAD, INJ, WASH. The port connections for these positions are illustrated in Figure 1 below.

Unpacking

Please check delivery against the packing list.

Description

Functional design

The valve consists of two main parts: the central shaft and the outer housing. The central shaft can be rotated 90° inside the housing. As the shaft is turned, flow channels connect two ports on the outer housing (Fig 1), allowing clear flow channels.

A schematic diagram on the top of the valve indicates which ports are connected during the rotation of the inner shaft. LOAD, INJ, and WASH indicate the locations of the three valve positions. Numbers 1-7 indicate the ports. On the top of the central shaft three black lines represent the flow channels connecting the ports.

Specifications

7-port rotary valve used for sample injection or as a system valve.

| | |
|-------------------------------------------|-----------------------------|
| Maximum operating pressure: | 20 bar (2 MPa, 285 psi) |
| Back pressure at 6 l/hr: | 0.2 bar (0.02 MPa, 2.8 psi) |
| Wetted material: | PEEK + 20 % PTFE |
| Sample loop: | external |
| Lever throw angle: | 90° |
| Dead volume between: | Ports 1-2, 2-3 5 µl |
| | Ports 2-4, 3-5, 4-6 10 µl |
| | Ports 5-7, 6-7 15 µl |
| Mean width x depth of flow channels (mm): | 1.1 × 1.6 mm |
| Sample loss: | 10-20 µl |

Chemical resistance

The valve body in contact with solvent is made of PEEK + 20 % PTFE and is resistant to organic solvents and salt buffers commonly used in a biochemical laboratory.

The valve can be used in a pH range of 2-13. If very strong acids (<pH 2) or bases (>pH 13) are used the valve should be rinsed immediately afterwards.

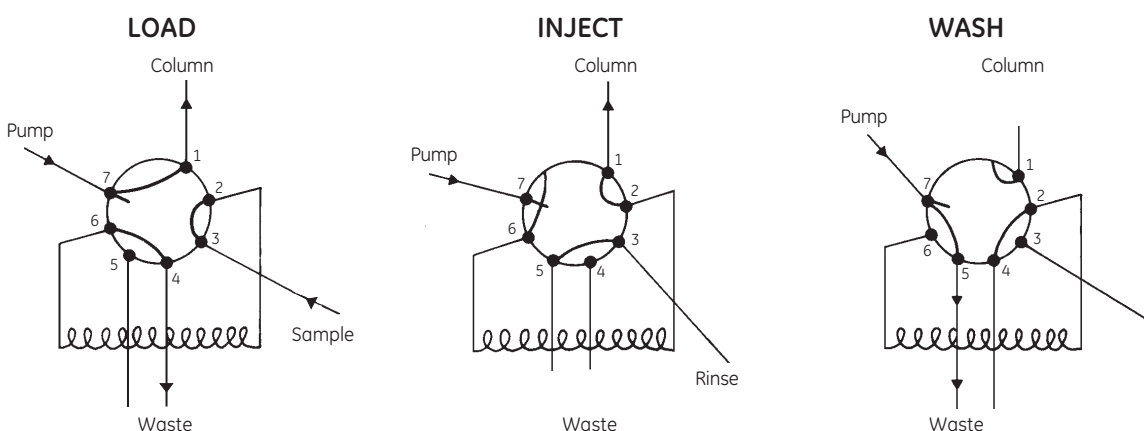


Fig 1. Three operating positions of the valve IV-7.



Mounting the IV-7

The valve is fixed in place by screwing the support rod into the valve body and attaching the rod to a laboratory rack.

An accessory valve holder (Code No. 19-7680-01) is available which specifically complements the Chromatography Rack.

The IV-7 as an injection valve

Tubing connection

In a system, a tubing connection consists of three parts: flanged tubing, nipple and nipple screw (Fig 2). For flanging the capillary tubing, use the Flanging/Start Up Kit, 120 V (Code No. 19-5079-01) or 220 V (Code No. 19-5090-01) together with the appropriate Flanging Tip Kit. Directions for flanging accompany the Start Up Kit. To make a proper seal, the flange should have a flat, smooth surface and a diameter of ca 3 mm.

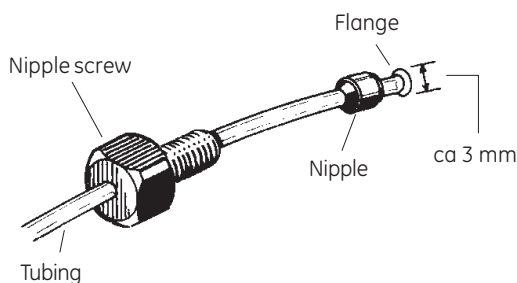


Fig 2. Tubing connection.

Port connections

To prepare a valve for connection to a system, you need different tubings attached to each port. Each port number, its system connection and tubing type are given in Table 1.

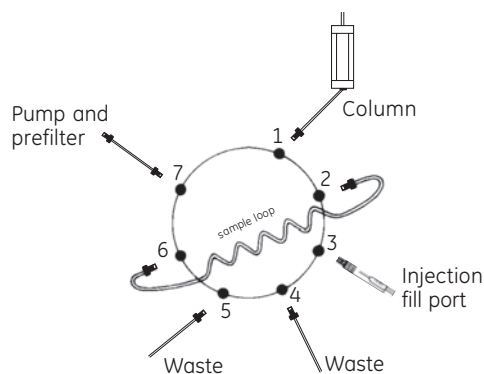


Fig 3. Port connections with proper tubings.

Make all the connections as in Figure 3. When tightening the tubing connectors into the ports, it is only necessary to finger tighten and then turn them 90° more with the supplied plastic wrench. When the valve is connected to the system, it is ready to be used as an injection valve.

Injection port

The injection port (port 3) is used for sample injection when the valve is functioning as an injection valve. Injection is simplified using either the supplied union with luer-lock (Code No. 18-1027-62) or the accessory Injection fill port (Code No. 19-7687-01). The union with luer-lock has an M6 male thread which is screwed finger-tight into port 3. Draw your sample into a syringe with a male luer-lock tip and fill the sample loop or Superloop™.

For use of the injection fill port see manual supplied with the port.

When applying larger sample volumes with a sample pump (Pump P-1, HiLoad™ Pump P-50), connect the outlet tubing from the pump with an M6 male union to port 3.

Position changes

Once the valve is mounted securely, valve position changes are made quite easily. LOAD and INJ are on the same level, so changing positions involves just pushing the shift lever to the right from LOAD to INJ. To change from INJ to WASH, push the lever up and even further towards the right to WASH position. The different levels and stops are designed as built-in safety features for proper positioning.

Sample injections

For first time use, flush out the entire valve with water or buffer. Then position the valve in LOAD and equilibrate your column. When you are ready to put a sample onto the column, load the sample into the sample loop through the injection port (port 3). The sample loop can be partially or completely loaded at atmospheric pressure with a syringe. When loaded, push the lever to INJ position and let the sample enter the column. When injecting different samples each time, rinse out between ports 3 and 5 while in INJ position. After 3 to 5 loop volumes, shift the lever back to LOAD position. The sample loop can now be reloaded but wait until your elution finishes before shifting to INJ again.

Changing pump solvent

WASH position is used when it is necessary to change solvents in the pump or synchronize the pumps (i.e. functions WASH or SYNC in the control unit). The solvent bypasses the column by flowing directly from the pump to waste.

The IV-7 as a system valve

As a system valve, the IV-7 can connect two columns to a single pump and detector system (Fig 4). With this set-up, Column I and Column II are selected by changing valve positions from LOAD to INJ.

Table 1. Port connections of the valve IV-7.

| Port No. | Connects to | Tubing |
|----------|------------------------------------------------------|---------------------------------------------------------------------------------------------|
| 1 | Column | Screw tubing from the top of the column into the port 1. |
| 2 | Sample loop or Superloop™ (between ports 2 and 6) | Various lengths, depending on desired volume. Flange and tubing connectors on both ends. |
| 3 | Injection fill port | No tubing needed. |
| 4 | Waste | Flange and tubing connectors on one ends. |
| 5 | Waste | Flange and tubing connectors on one ends. |
| 6 | Sample loop or Superloop™ (between ports 2 and 6) | Various lengths, depending on desired volume. Flange and tubing connectors on both ends. |
| 7 | Pump | Flange and tubing connectors on both ends. |

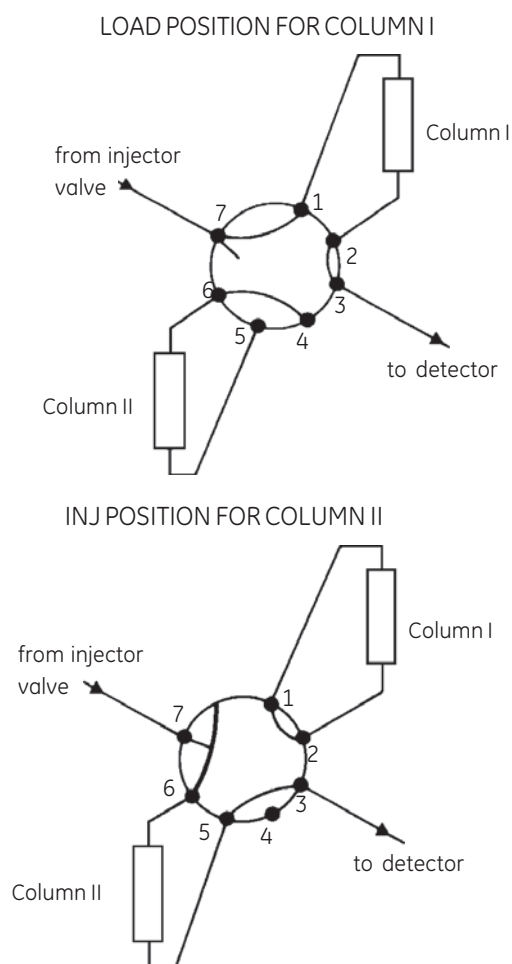


Fig 4. An example of the IV-7 as a system valve.

Valve maintenance and repair

The valve can be disassembled for cleaning. Alternatively pump solvents through to wash it out. Suitable cleaning solvents are water, ethanol, 75% acetic acid and detergents. Always leave the valve with distilled water in it. This helps to avoid precipitation of salts, etc.

For disassembling (Fig 5):

1. Remove the four Allen head screws on the bottom of the valve. Loosen each one equally in turn so the bottom half comes off parallel to the valve body.
2. Slide these screws out with the bottom stainless steel plate.
3. Remove the distributing plate containing the 7 ports.
4. Remove the channel plate and replace if necessary.
5. Place the channel plate and the distributing plate into an ultrasonicator with an appropriate wash solution. These two PEEK parts are also the only parts likely to need replacement. They are supplied together as spare parts in the Valve kit IMV-7 (Code No. 18-4594-01). Replace these when worn.
6. Reassemble the valve. First put the valve in LOAD position and locate the short straight channel in the channel plate between ports 2 and 3. When properly aligned, snap the channel plate onto the valve axle. When reassembling, make sure the blank port (filled) in the distributing plate aligns with position number 8 marked on the aluminium valve body. Take care not to overtighten the Allen screws to avoiding rounding the heads.

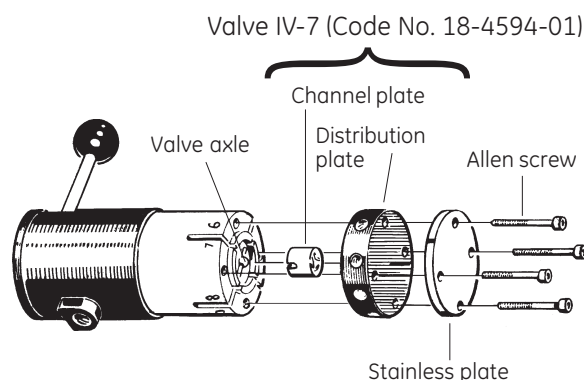


Fig 5. Disassembled Valve IV-7.

Spare parts

| Designation | No. per pack | Code No. |
|---------------------------------------------|--------------|------------|
| Valve kit IMV-7 | 1 | 18-4594-01 |
| Allen screw (M3x20) | 2 | 19-7564-01 |
| Adaptor repair kit | 1 | 19-7818-01 |
| Accessories | | |
| Capillary tubing (o.d. 1.8 mm, i.d. 1.2 mm) | 2 m | 19-4370-01 |
| Capillary tubing (o.d. 2.7 mm, i.d. 1.9 mm) | 2 m | 18-8207-01 |
| Tubing connectors (o.d. 1.8 mm) | 5 | 19-7476-01 |
| Tubing connectors (o.d. 2.7 mm) | 5 | 18-4652-01 |
| Union luer-lock female/M6 male | 2 | 18-1027-62 |
| Injection fill port | 1 | 19-7687-01 |
| Injection needles o.d. 0.55 mm) | 6 | 18-7143-01 |
| Sample loops 1 ml, 2 ml | 1 of each | 18-5897-01 |
| Superloop 10 ml | 1 | 19-7585-01 |
| Superloop 50 ml | 1 | 19-7850-01 |
| Valve holder | 1 | 19-7680-01 |
| Flanging/Start Up kit, 120 V | 1 | 19-5079-01 |
| 220 V | 1 | 19-5090-01 |
| Flanging Tip kit (i.d. 1.2 mm) | 1 | 18-4597-01 |
| Flanging Tip kit (i.d. 1.9 mm) | 1 | 18-4596-01 |

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