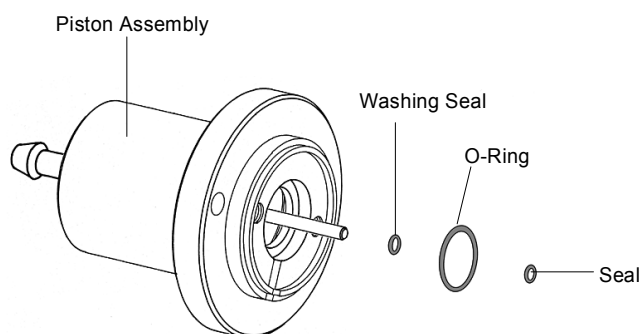


## Piston Replacement Kit

Each piston in the SD-1 can be replaced using a replacement kit listed below. Both pistons should be replaced at the same time unless one of the pistons has been broken or chipped.

|              |                                         |
|--------------|-----------------------------------------|
| R0-071057-06 | Piston Replacement Kit, 200 mL/min head |
| R0-071057-07 | Piston Replacement Kit, 800 mL/min head |
| R0-071057-08 | Piston Replacement Kit, 500 mL/min head |
| R0-071057-07 | Piston Replacement Kit, 3.2L/min head   |

A piston replacement kit (for 200 mL/min head) is shown. Other kits are similar. Each kit contains: Piston Assembly, O-ring, Seal, Washing Seal



### Piston Replacement Kit Contents

To replace a piston, first disconnect the SD-1 from AC power and remove the liquid head as detailed below. You do not need to remove the check valves for this procedure.

### Liquid Head Removal

For this procedure you will need two open-ended wrenches (5/16 inch/.312 cm and 1/2 inch) and three T-handle hex wrenches (9/64-inch, 5/32-inch, and 3/16-inch).

1. Stop the SD-1 by pressing the STOP key.

Do not switch off the SD-1; power must be ON for the heads to be removed. Release pressure from the HPLC systems by opening the drain valve.

2. Press  to open the SPECIAL DISPLAY:

|             |  |       |
|-------------|--|-------|
| 0.00 mL/m   |  | 0 psi |
| SET UP      |  |       |
| SERVICE LOG |  |       |

3. Press  to access the setup functions shown below.

|                       |    |                     |
|-----------------------|----|---------------------|
| 0.00 mL/m             |    | 0 psi               |
| HEADS<br>CHANGE       | ID | DEVICE#<br>PUMP CIM |
| ↓ NO ↑ NO             |    | 1 8                 |
| SET CLOCK<br>MM/DD/YY |    | HH:MM:SS            |
| 9 12 92               |    | 10 33 00            |

4. With the cursor on HEADS CHANGE / NO, press . NO will scroll to YES:

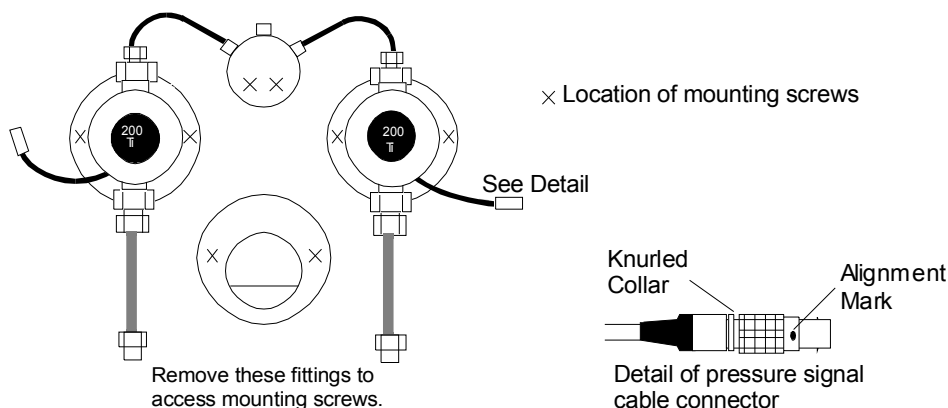
|                                                                      |
|----------------------------------------------------------------------|
| DO YOU WISH TO ENGAGE THE HEADS?<br>Press ENTER if YES, CLEAR if NO. |
|----------------------------------------------------------------------|

5. Press ENTER to confirm head removal.

The following message will be displayed:

|                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING</b><br><b>REMOVE MOUNTING SCREWS, TUBING</b><br><b>AND CONNECTORS</b><br>Press ENTER when done, CLEAR to exit. |
|---------------------------------------------------------------------------------------------------------------------------|

The liquid heads can be removed as a complete assembly. Or, if you prefer, you can disconnect the tubing from the inlet and outlet check valves.



### Liquid Head Set

6. First remove the high pressure fitting at the outlet tee using a 5/16-inch open-ended wrench. Cap the outlet tee with the cap you removed during initial installation.

7. With a 1/2-inch open-ended wrench, loosen and remove the solvent inlet fitting at the inlet tee, and cap the inlet tee with the cap you removed during initial installation. Then remove the other two fittings in the inlet tee, for access to the mounting screws. Leave the tubing attached to the inlet check valves.
8. Disconnect each pressure signal cable from the socket on the front panel by grasping the knurled collar and pulling back gently. You will feel a slight “give” as the spring-loaded ring is pulled back, then the connector will disengage. If you do not pull back the knurled collar the cable will remain in place. DO NOT PULL THE CABLE or any part of the connector except the knurled ring.
9. With a 9/64-inch T-handle hex wrench, loosen and remove the two mounting screws in the outlet tee. Put the mounting screws aside for mounting the replacement head set.
10. With a 5/32-inch T-handle hex wrench, loosen and remove the two mounting screws in the inlet tee. Put the mounting screws aside for mounting the replacement head set.
11. With a 3/16-inch T-handle hex wrench, loosen and remove the two mounting screws in both liquid heads. Put the mounting screws aside for mounting the replacement head set.

***Preparation is complete. Now the SD-1 software will disengage the heads.***

12. Press ENTER to confirm removal of mounting screws.

After pressing ENTER, the SD-1 will start the disengagement sequence. One at a time the liquid heads will be pushed out from the front panel. Support the weight of the liquid heads during disengagement.

When the heads are fully disengaged, the display will read as follows:

**HEADS DISENGAGED. REMOVE AND REPLACE**  
**Press ENTER when completed.**

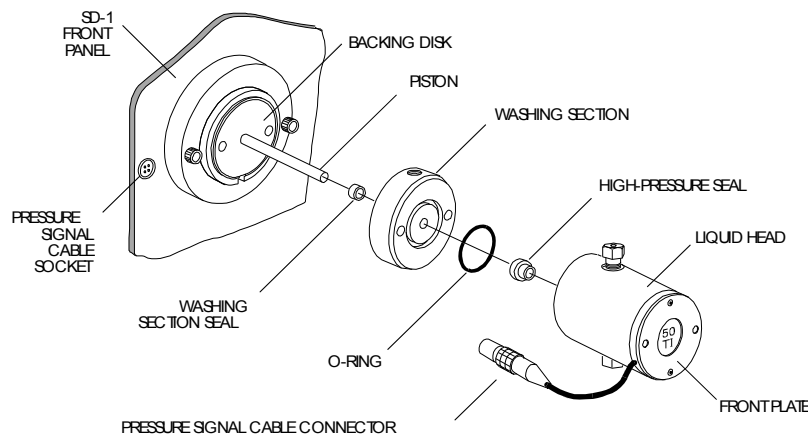
13. Remove each head by pulling it away from the front panel. You will have to overcome slight resistance from the spring in the collet.

At the same time, remove the inlet and outlet tees. Put the complete assembly aside.

## ***Seal Replacement***

Seals need to be replaced every so often because friction from the moving pistons causes the seals to wear. Seal wear is accelerated under adverse conditions, such as pumping at a high flow rate or pressure, pumping aqueous solutions, or dirty or contaminated mobile phase. More gentle operation (low flow, low pressure, organic solutions, fresh clean HPLC-grade mobile phases) will result in longer seal life. However, every seal will eventually need replacing. Software in the SD-1 allows you to both check the seal wear and to log when the seals are changed.

Each liquid head in the SD-1 has one high-pressure piston seal, one washing section seal, and one o-ring. These parts are shown in the exploded view of the liquid head assembly. The illustration shows a 50 mL/min head. Seals for the 200 and 800 mL/min heads are similar but larger.



### Liquid Head Exploded View (50 mL/min head shown)

Seals and o-rings are supplied in pairs. Both high pressure seals should be replaced at the same time, both washing section seals should be replaced at the same time, and both o-rings should be replaced at the same time. However, you do not have to replace different types of seal at the same time. For example, it is not necessary to replace the o-ring because you are changing the washing section seal. Seals will wear at different rates: in general, you will need to replace the high-pressure seals more often than the washing section seals or the o-rings.

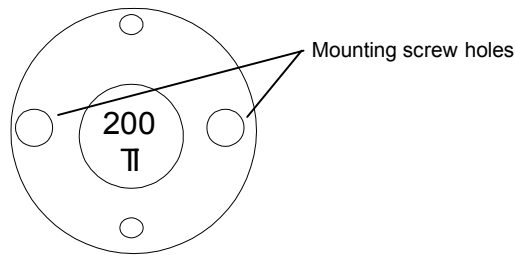
To replace seals you need a 3/16" T-handle hex wrench and replacement seals from the list below:

| Head Size                                                             | 50 mL/min    | 200 mL/min   | 500 mL/min   | 800 mL/min   | 3.2L/min                                              |
|-----------------------------------------------------------------------|--------------|--------------|--------------|--------------|-------------------------------------------------------|
| High pressure seals (2)                                               | R0-071056-50 | R0-071056-20 | R0-071055-60 | R0-071056-80 | R0-071057-34                                          |
| Washing section seals (2)                                             | R0-071056-51 | R0-071056-21 | R0-071055-62 | R0-071056-81 | R0-071057-33                                          |
| O-rings (2)                                                           | R0-071056-22 | R0-071056-22 | R0-071056-22 | R0-071056-82 | R0-025350-45                                          |
| Seal kit containing 2 high pressure seals, 2 washing seals, 2 o-rings | R0-071056-55 | R0-071056-25 | R0-071057-29 | R0-071056-85 | No kit exists. Purchase the above parts individually. |

You do not need to remove the liquid heads from the front panel to change seals or o-rings but you must remove the fittings at the outlet and inlet check valves. It is recommended that you complete the seal change (or o-ring change) on one liquid head before beginning on the other liquid head. The procedure below is for one liquid head.

### Dismantling the Liquid Head

1. Remove the fittings from the outlet and inlet check valves.
2. Remove the pressure signal cable connector by pulling back on the knurled ring. Do not pull on the cable itself.
3. Insert the hex wrench into one of the screw holes in the 3 o'clock and 9 o'clock positions at the front plate of the liquid head. The wrench will stop against the mounting screw.



### Location of Mounting Screws

4. Turn the wrench gently until you feel it engage the socket in the mounting screw.
5. The mounting screw is a tight fit. When the hex wrench is engaged in the socket, sharply turn the wrench a small amount counter-clockwise to begin loosening the mounting screw.
6. Move to the other mounting screw and repeat steps 4 and 5.



### CAUTION

**On the 50 mL/min liquid head it is very important to support the weight of the liquid head body as you remove the mounting screws. If unsupported, the weight of the liquid head body could break the piston.**

7. Hold the liquid head body and fully loosen both mounting screws—about 9 full turns for each mounting screw. The mounting screws will remain captive behind the front plate.
8. Still supporting the weight of the liquid head, carefully slide the liquid head body straight out from the pump until it clears the piston. Do not apply any sideways or up and down pressure to the piston while removing the liquid head.
9. Carefully slide the washing section off the piston while you support its weight. Do not dismantle the liquid head assembly any further; the backing disk should remain in place.

### Removing Seals/O-ring

1. The high pressure seal will remain in the recess at the back of the liquid head body. The o-ring will remain in its groove at the front of the washing section. The washing section seal will remain in the recess at the back of the washing section.
2. Carefully remove the seal from its recess using the end of the piston to pry it out. Do not use a sharp metal tool, such as a penknife, which could scratch the sealing area of the liquid head or washing section. Remove the o-ring if necessary.

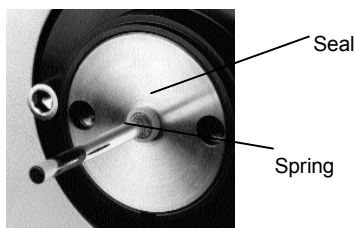
### Replacing Seals/O-ring

---

NOTE: When each seal is installed correctly, the seal spring is visible from the front.

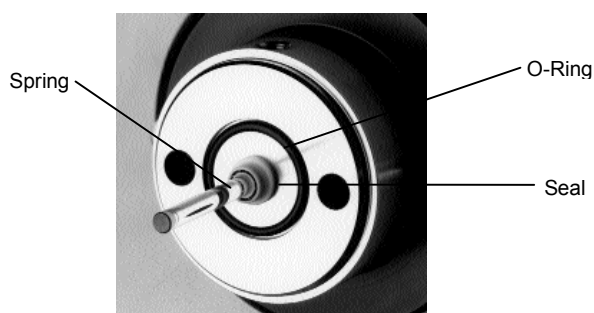
---

1. Slide the replacement washing section seal along the piston until it reaches the backing disk. The seal spring must be facing out, as shown in below.



#### **Washing Section Seal (50 mL/min head shown)**

2. Support the weight of the washing section and slide it over the piston as far as possible. You may notice as the seal fits into the recess in the washing section.
3. Place the o-ring into the groove at the front of the washing section.
4. Slide the high-pressure seal along the piston until it reaches the washing section. The spring must be facing out, as shown in below.



#### **O-ring and High Pressure Seal (50 mL/min head shown)**

5. Align the liquid head so that the slot at the bottom is lined up with its matching slot in the housing on the front panel. Supporting the weight of the liquid head, carefully slide it along the piston until it stops.
6. Still holding the liquid head, insert the hex wrench into one of the mounting screw holes and tighten the mounting screw until you feel some resistance. Then tighten the other mounting screw until you feel resistance.

---

**NOTE:** It is important to tighten both mounting screws a little at a time until they are both tight.

---

7. Tighten each mounting screw in turn a little at a time until both screws are tight.
8. Replace the fittings at the outlet and inlet check valves.
9. Repeat the procedure for the other liquid head.

### ***Removing the Old Piston Assembly***

1. Hold the liquid head body with one hand and insert the hex wrench into one of the screw holes in the 3 o'clock and 9 o'clock positions at the front plate of the liquid head. The wrench will stop against the mounting screw.
2. Turn the wrench gently until you feel it engage the socket in the mounting screw.

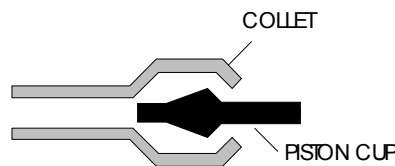
3. When the hex wrench is engaged in the socket, turn the wrench sharply a small amount counter-clockwise to begin loosening the mounting screw.
4. Move to the other mounting screw and repeat steps 2 and 3.
5. Remove the liquid head (with washing section) from the piston assembly. The old seals and old O-ring will probably remain on the washing section.
6. Carefully slide the washing section away from the liquid head. Remove the backing disk from the old piston assembly.

### ***Installing the New Piston Assembly***

1. Take the replacement piston assembly and slide the backing disk over the piston. Align the holes with the screw holes on the piston assembly. Refer to the photos and instructions in *Replacing Seals/O-ring*, and slide the washing seal over the piston.
2. Slide the washing section over the piston and install the new O-ring and seal as shown on page 5.
3. Carefully slide the liquid head over the piston, making sure that the holes are aligned.
4. Using the 3/16" hex wrench, tighten each screw until you feel resistance. Then tighten both screws a little at a time until they are both fully tightened.
5. Repeat this procedure for the other liquid head.

### ***Liquid Head Replacement***

1. Take the replacement liquid head set assembly and hold both heads in position, with the piston cups inside the open piston collets. See diagram below.



2. Press ENTER to begin the liquid head engagement sequence.

The collets will close over the piston cups and when fully closed will draw the liquid heads into place. When both liquid heads are in place the display will read:

**REPLACE AND TIGHTEN SCREWS ON BOTH HEADS.  
PLUMB CONNECTIONS**

**Press ENTER when completed.**

3. Replace and tighten the mounting screws in each liquid head with the 3/16-inch hex wrench.
4. Replace and tighten the mounting screws in the inlet tee with the 5/32-inch hex wrench.
5. Replace and tighten the mounting screws in the outlet tee with the 9/64-inch hex wrench.
6. Replace the low pressure inlet fitting in the inlet tee with the 1/2-inch open-ended wrench and tighten 1/4-turn past fingertight. Connect the inlet tubing (tee to inlet check valves).
7. Replace the high pressure outlet fitting in the outlet tee with the 5/16-inch open-ended wrench and tighten 1/4-turn past fingertight.



## **WARNING**

Damage to the pump and possible personal injury may occur if the pump is operated with liquid heads not properly mounted.

The SD-1 software cannot tell whether or not you have actually replaced the mounting screws. It is extremely important that the mounting screws are properly attached before attempting to operate the SD-1.

8. Press ENTER to confirm the mounting screws and plumbing are connected.

When you have done this the display will read:

**PLUG IN BOTH CONNECTORS**  
Press ENTER when Completed.

9. Reconnect the pressure signal cables.

Press ENTER to complete the head replacement procedure.

If you do not connect the pressure cable, the software will not let you proceed until you have done so.

The display will read (with appropriate values for the actual head size):

**HEAD REPLACEMENT IS COMPLETE**  
Max Flow 200 mL/m Max Pressure 6000 psi (40 bar)  
Press ENTER to continue