

# Waters PrepLC™ Column Manual

Prep LC Universal Base  
(25mm / 40mm)  
Info Only

Waters

34 Maple Street  
Milford, MA 01757

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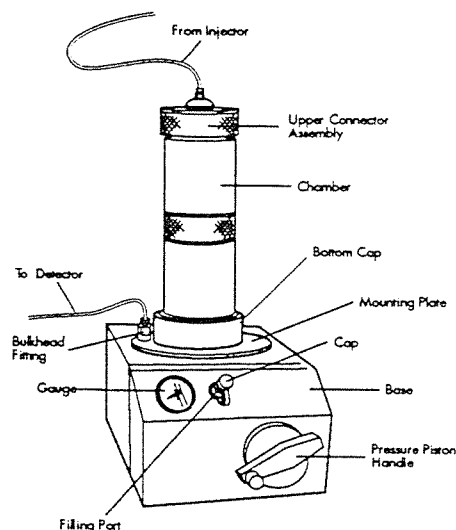
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## 2.2 Installing the Waters PrepLC 25 mm or 40 mm Assembly

The Assembly unit is shipped in separate boxes that contain:

- Box 1: PrepLC Universal Base, start-up kit, and a Waters PrepLC™ Manual
- Box 2: Chamber Assembly, upper connector assembly, spacer, union, and start-up kit

Figure 2-3: PrepLC Assembly



14

Unpack each box and inspect all items for damage. If you have any concerns, contact the shipping agent and Waters Corporation. In the USA, the toll-free phone number is 800-252-4752. Refer to the subsidiary list on the back of this manual for international Waters phone numbers.

Fill out and mail the Warranty Card. Make sure you also record the serial number, located on the back of the Universal Base, and start-up date in Chapter 6 — Warranty and Service.

### 2.2.1 Assembling the Unit

Tools required:

- Two 5/16-inch open-end wrenches
- Plastic 50 mL syringe

Radial compression liquid:

Isopropanol

The Assembly unit consists of two major parts:

- PrepLC Universal Base — the source of radial compression pressure
- PrepLC Chamber Assembly— where column segments are held

15

The Universal Base can accommodate either a 25 mm or 40 mm Chamber Assembly. Each Chamber Assembly holds either a column segment with a Guard-Pak and union or a column segment with a spacer (see Figure 2-1). In order to use two or three columns, the chamber must be fitted with extension tubes (refer to section 2.2.2).

To connect the Universal Base to either a 25 mm or 40 mm Chamber Assembly:

1. Unscrew the chamber from the bottom cap (see Figure 5-2 or 5-4).
2. Remove the yellow cap from the end of the tubing inside the base. The cap is visible through the top opening.
3. Connect this tubing to the threaded port located at the bottom cap (see item 2 of Figure 5-2 or 5-4) on the mounting plate. Tighten with the 5/16-inch wrench.
4. Put the mounting plate on the base and tighten the three thumb screws located on the flange.

On the initial use or after the Assembly unit has been disassembled, but before the chamber or column is installed, the reservoir should be filled.

5. Remove the plug from the filling port. Turn the pressure piston handle counterclockwise until it is fully extended.
6. Using a plastic 50 mL syringe, fill the reservoir with isopropanol through the filling port until liquid appears in the cavity of the bottom cap. An initial resistance might be felt until the check valve opens.

16

7. Continue filling the reservoir until firm resistance is felt. For a new module, this is approximately 100 mL. Replace the plug.
8. Replace the chamber and firmly hand-tighten it.
9. Attach the Guard-Pak and union (or spacer) to the column segment.
10. Insert the column into the chamber with the Guard-Pak (or spacer) on top.
11. Replace and firmly tighten the upper connector.
12. Using 0.040-inch I.D. tubing, connect the bulkhead fitting marked "Outlet" to a detector, then run tubing between the upper connector and the injector or pump. Smaller diameter tubing generates excessive backpressure.

### **2.2.2 Using the Extension Tubes**

Both 25 mm and 40 mm chambers can accommodate up to two Waters *Prep*LC Extensions Tubes (P/N's 25 mm WAT022180 and 40 mm WAT022365) for use with multiple column segments. The extension tubes are placed on the top of the chamber. The Universal Base and Chamber Assembly should be connected. If this has not been done, complete steps 1 to 8 of section 2.2.1.

17

To add one or two extension tubes:

1. Connect the extension tube(s) to the chamber and firmly hand-tighten.
2. Attach a union and Guard-Pak (or spacer) to one end of the initial column segment.
3. Attach one or two additional union and column segment combinations to the other end of the initial column (see Figure 2-1).
4. Insert the assembled column into the chamber with the Guard-Pak (or spacer) on the top. Push down firmly to seat the columns.
5. Install the upper connector assembly onto the upper extension tube and firmly hand-tighten.

### 2.2.3 Compressing the Column Segment

Before starting the eluent flow, column segments must be compressed. **The radial compression pressure during operation must be higher than or equal to the mobile phase pressure in the system.**

To compress a column:

1. Turn the pressure piston handle clockwise until the pressure gauge registers 500 psi.
2. If the handle bottoms before reaching 500 psi, turn the handle counterclockwise until the pressure gauge registers 0 psi.
3. Turn the pressure piston handle counterclockwise as you fill the reservoir with isopropanol through the filling port with the syringe. An initial resistance might be felt until the check valve opens.
4. Recompress the unit by turning the pressure piston handle clockwise. If you are still unable to reach the required compression pressure, disassemble the unit by removing the upper connector knob and follow the instructions in section 2.2.1.

18



**Caution:** Ensure that the pump pressure limit setting is set to a maximum of 1,500 psi and the system's pressure gauge is properly calibrated.

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<u>Pressure Limits:</u>	Maximum mobile phase pressure	1,500 psi
	Maximum radial compression	2,000 psi

After the initial compression and without flow, radial compression pressure drops slowly as the column segments compress. **Without flow the radial compression pressure should be 500 psi.** Always readjust the radial compression pressure as necessary.

When the flow starts, radial compression pressure rises. This normal behavior is caused by the expansion of the column(s) under the mobile phase pressure. **With flow, the radial compression pressure should not exceed 2,000 psi.**

## 4.2 Troubleshooting the Waters PrepLC Assembly

Use the table below for troubleshooting your PrepLC Assembly.

Table E: Waters PrepLC Assembly Troubleshooting Guide

Symptom	Reason	Corrective Action
Inability to achieve desired compression	Upper connector knob or chamber not screwed on firmly	Tighten upper connectors or chambers.
	Insufficient compression liquid	See filling procedure in section 2.2.1, step 6.

Table E: Waters PrepLC Assembly Troubleshooting Guide (Continued)

Symptom	Reason	Corrective Action
High system backpressure	Blockage or restriction in HPLC system	Remove the PrepLC Assembly from the system and replace it with a union. Check system pressure under the same flow conditions.
If the backpressure lowers, the high system backpressure is caused by the Assembly; go to next symptom. If backpressure does not lower, consult the HPLC instrument manual to troubleshoot the system.		
High system pressure caused by PrepLC Assembly	Inlet or outlet connector tubing plugged	Replace the tubing.
	Column segment plugged	Replace column segment.
	Guard-Pak segment plugged	Replace the Guard-Pak.

**Table E: Waters PreplC Assembly Troubleshooting Guide (Continued)**

Symptom	Reason	Corrective Action
No flow radial compression pressure decrease	Column compressing	Normal occurrence. Readjust no flow radial compression pressure to 500 psi.
	If radial compression pressure continues to decrease after pressure adjustment, then consider the following reason.	
	Tubing connecting chamber to the solvent reservoir leaking	Tighten tubing fittings; see item 11 Figure 5-7.
Leak at top of the chamber	Chamber O-rings leaking	Call Waters Technical Support.
Pool of liquid under the unit	Tubing connecting chamber to the solvent reservoir leaking	Tighten tubing fittings; see item 11, Figure 5-7.

**Table E: Waters PreplC Assembly Troubleshooting Guide (Continued)**

Symptom	Reason	Corrective Action
Leak at the bottom of the chamber	Bottom cap O-rings leaking	Call Waters Technical Support.
Pool of liquid under unit	Bottom cap O-rings leaking	Call Waters Technical Support.
	Pressure piston O-ring leaking	Call Waters Technical Support.
No visible leak, but fluid dripping from waste line when the pump is not operating	Connector, spacer, or union O-ring leaking	Call Waters Technical Support.
Leak at junction with extension tube	Extension tube O-ring leaking	Replace extension tube O-ring; refer to section 5.3.

**Table E: Waters PreplC Assembly Troubleshooting Guide (Continued)**

Symptom	Reason	Corrective Action
Leak from filling port	Check valve or O-ring leaking	Replace check valve and filling port O-ring; refer to section 5.2.3.
Leak from pressure gauge, or gauge does not read 0 psi	Pressure gauge leaking or damaged	Replace pressure gauge; refer to section 5.2.5.

### 5.2.1 Replacing O-rings on the 25 mm Chamber

There are three places where O-rings can be replaced on the 25 mm Chamber:

- Upper connector
- Lower connector
- Bottom cap

The following procedures describe the replacement processes.

#### Replacing O-rings on the Upper Connector

There are two O-rings that can be replaced in the upper connector. All items in this subsection refer to Figure 5-2. To replace the O-rings:

1. Disconnect the tubing from the upper connector (see item 9) at the union (see item 10).
2. Unscrew the upper connector from the chamber.
3. Remove the first O-ring (see item 14) using a needle-sharp implement and replace it with a new O-ring. If the second O-ring needs to be replaced:
  4. Pry off the black plastic cap (see item 8).
5. Remove the retaining ring (see item 7) using a screwdriver.
6. Remove the upper connector body (see item 15).
7. Remove the second O-ring (see item 13) with a needle-sharp implement and replace it with a new O-ring.
8. Reassemble.

#### Replacing O-rings on the Lower Connector

There are two O-rings that can be replaced on the lower connector. The first O-ring can be replaced without disassembling the lower connector. However, to access the second O-ring the connector must be disassembled.

To replace the O-rings:

1. Unscrew the chamber (see item 4, Figure 5-2) from the bottom cap (see item 2).
2. Unscrew the mounting plate (see item 1) from the base.
3. Remove tubing (see item 9).
4. Using the retaining ring pliers, remove retaining ring (see item 18).
5. Remove the first O-ring (see item 3, Figure 5-3) using a needle-sharp implement and replace it with a new O-ring.

If the second O-ring needs to be replaced:

6. Remove the retaining ring (see item 5) and push the inner connector (see item 1) out.
7. Remove the second O-ring (see item 2) using a needle sharp-implement and replace it with a new O-ring.
8. Reassemble.

#### Replacing O-rings on the Bottom Cap

There are two O-rings that can be replaced in the bottom cap. All items in this subsection refer to Figure 5-2.

To replace the O-rings:

1. Remove the chamber (see item 4) from the bottom cap (see item 2).
2. Remove the O-rings (see items 17 and 19) with a needle-sharp implement.
3. Place each new O-ring on its groove and press it into position with a flat plastic object. Alternate the points of initial insertion by pressing at the 12, 6, 9, and 3 o'clock positions.
4. Complete the insertion by pressing the O-ring down along the entire circumference.
5. Reassemble.

### 5.2.2 Replacing O-rings on the 40 mm Chamber

There are three places where O-rings can be replaced on the 40 mm Chamber:

- Upper connector
- Lower Connector
- Bottom Cap

#### Replacing O-rings on the Upper Connector

There are three O-rings that can be replaced on the upper connector. The first O-ring can be replaced without disassembling the upper connector. However, to access the other two O-rings the connector must be disassembled.

To replace the O-rings:

1. Disconnect the tubing from the upper connector.
2. Unscrew the upper connector knob (see item 5, Figure 5-4) from the chamber.
3. Remove the first O-ring (see item 5, Figure 5-5) from the upper connector using a needle-sharp implement and replace it with a new O-ring.

If the other two O-rings need to be replaced:

4. Pry off the black plastic cap (see item 8, Figure 5-4).
5. Remove retaining ring (see item 7) using a screwdriver.
6. Remove retaining ring (see item 2, Figure 5-5) and push the inner connector (see item 1) out.
7. Remove the O-rings (see items 4 and 6) using a needle-sharp implement and replace them with new O-rings.
8. Reassemble.

#### Replacing O-rings on the Lower Connector

There are three O-rings located on the lower connector. The first two O-rings can be replaced without disassembling the lower connector. However, to access the third O-ring the connector must be disassembled.

To replace the O-rings:

1. Unscrew chamber (see item 4, Figure 5-4) from bottom cap (see item 2).
2. Remove mounting plate (see item 1) from the base.
3. Remove the tubing assembly (see item 9).
4. Remove retaining ring (see item 16) with a screwdriver.
5. Remove the first two O-rings (see items 3 and 4 of Figure 5-6) using a needle-sharp implement and replace them with new O-rings.

If the third O-ring needs to be replaced:

6. Remove the retaining ring (see item 6) and push the inner connector (see item 1) out.
7. Remove the third O-ring (see item 2) using a needle-sharp implement and replace it with a new O-ring.
8. Reassemble.

#### Replacing O-rings on the Bottom Cap

There are two O-rings that can be replaced in the bottom cap. All items in this subsection refer to Figure 5-4.

To replace the O-rings:

1. Remove the chamber (see item 4) from the bottom cap (see item 2).
2. Remove the O-rings (see items 15 and 17) using a needle sharp implement.
3. Place each new O-ring on its groove and press it into position with a flat plastic object. Alternate the points of initial insertion by pressing at the 12, 6, 9, and 3 o'clock positions.
4. Complete the insertion by pressing the O-ring down along the entire circumference.
5. Reassemble.



### **5.2.3 Replacing the Check Valve and Filling Port O-ring**

The check valve (see item 2, Figure 5-7) is located behind the filling port luer adapter (see item 5). Its O-ring (see item 3) is positioned on the top of the check valve.

To replace the check valve and O-ring:

1. Ensure that the pressure piston handle is fully extended.
2. Unscrew the chamber (see item 4 of Figure 5-2 or 5-4) from the mounting plate (see item 1).
3. Unscrew the filling port luer adapter (see item 5, Figure 5-7) using a 7/16-inch wrench.
4. Remove the filling port O-ring (see item 3) using a needle-sharp implement.
5. Tilt the Universal Base forward with the filling port facing down. Tap the base to eject the check valve. (It could take a few forceful taps for the check valve to come out of the cavity if it is wet.)
6. Insert a new check valve with the flat end down, then place a new O-ring on top of the check valve.
7. Reassemble.

### **5.2.4 Replacing Pressure Piston O-ring**

The pressure piston assembly (see item 6, Figure 5-7) is attached to the threaded handle shaft.

To replace the pressure piston O-ring:

1. Turn the pressure piston assembly handle counterclockwise until it is fully extended.
2. Unscrew and remove the chamber (see item 4 of Figure 5-2 or 5-4).
3. Turn the unit upside down over a container and empty any solvent from the unit by turning the pressure piston assembly handle clockwise until it bottoms.
4. Use a 3/4-inch wrench to unscrew the pressure piston assembly (see item 6, Figure 5-7) and pull it out of the base.
5. Using a needle sharp-implement, remove the O-ring (see item 1) from the pressure piston and replace it with a new O-ring.
6. Reassemble.

### **5.2.5 Replacing the Pressure Gauge**

The pressure gauge is located on the Universal Base. The base must be disassembled to replace the gauge.

To replace the pressure gauge:

1. Disconnect the outlet tubing from the bulkhead fitting (see item 16, Figure 5-2 or item 14, Figure 5-4).
2. Unscrew and remove the chamber (see item 4 of Figure 5-2 or 5-4).
3. Unscrew the thumb screws on mounting plate (see item 1).
4. Lift up the mounting plate and disconnect the reservoir tubing from the bottom cap using with a 5/16-inch wrench.
5. Place the unit upside down over a container and empty isopropanol from the unit by turning the pressure piston assembly handle clockwise until it stops.
6. With a Phillips screwdriver, remove the two screws from the back of the base.
7. Slide the cover toward the back of the base and remove it.
8. Disconnect the tubing from the gauge adapter with a 5/16-inch wrench.
  
9. Use a 1/4-inch wrench to remove the two nuts that hold the gauge adapter in place and remove the gauge clip.
10. Remove the pressure gauge from the front of the base.
11. Remove the gauge adapter from the old pressure gauge and place it on the new pressure gauge. Use a thread sealant (such as Teflon® tape) on this connection and firmly tighten it with a 1/2-inch wrench.
12. Reassemble.

### **5.3 Replacing Extension Tube O-rings**

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An extension tube (P/N's 25 mm WAT022180 and 40 mm WAT022365) has only one O-ring, which is located at the bottom of the internal thread. This procedure is the same for all units.

To access the O-ring:

1. Unscrew the extension tube.
2. Remove the O-ring in the extension tube using a needle sharp implement.
3. Place the new O-ring on its groove and press it into position with a flat plastic object. Alternate the points of initial insertion, by pressing at the 12, 6, 9, and 3 o'clock positions.
4. Complete the insertion by pressing the O-ring down along the entire circumference.
5. Reassemble.

### **5.1.2 Replacing the Pressure Piston O-ring**

The pressure piston O-ring is replaced by first removing the piston assembly from the Module. All item numbers in this subsection refer to Figure 5-1.

To remove the piston assembly:

1. Ensure the pressure piston handle is fully extended.
2. Place an absorbent paper towel under the Module. Use the one-inch wrench to remove the piston assembly (see item 2).
3. Rinse the piston cavity with isopropanol to flush any debris.
4. Remove the O-ring (see item 1) from the end of the piston and replace it with a new O-ring.
5. Reassemble.

### **5.1.3 Replacing the O-rings for the End Connector**

Both end connectors are the same. There are two O-rings located in each end connector. All item numbers in this subsection refer to Figure 5-1.

To replace the O-rings:

1. Disconnect the tubing from the end connector assembly that is leaking.
2. Unscrew the end connector assembly.
3. Remove the first O-ring (see item 7) using a needle-sharp implement and replace it with a new O-ring.

If the second O-ring needs to be replaced:

4. Pry off the black plastic cap (see item 10).
5. Remove the retaining ring (see item 3) using a screwdriver.
6. Remove the connector (see item 8).
7. Remove the second O-ring (see item 6) using a needle-sharp implement and replace it with a new O-ring.
8. Reassemble.

49

## **5.2 Maintenance Procedures for Waters PrepLC Assembly**

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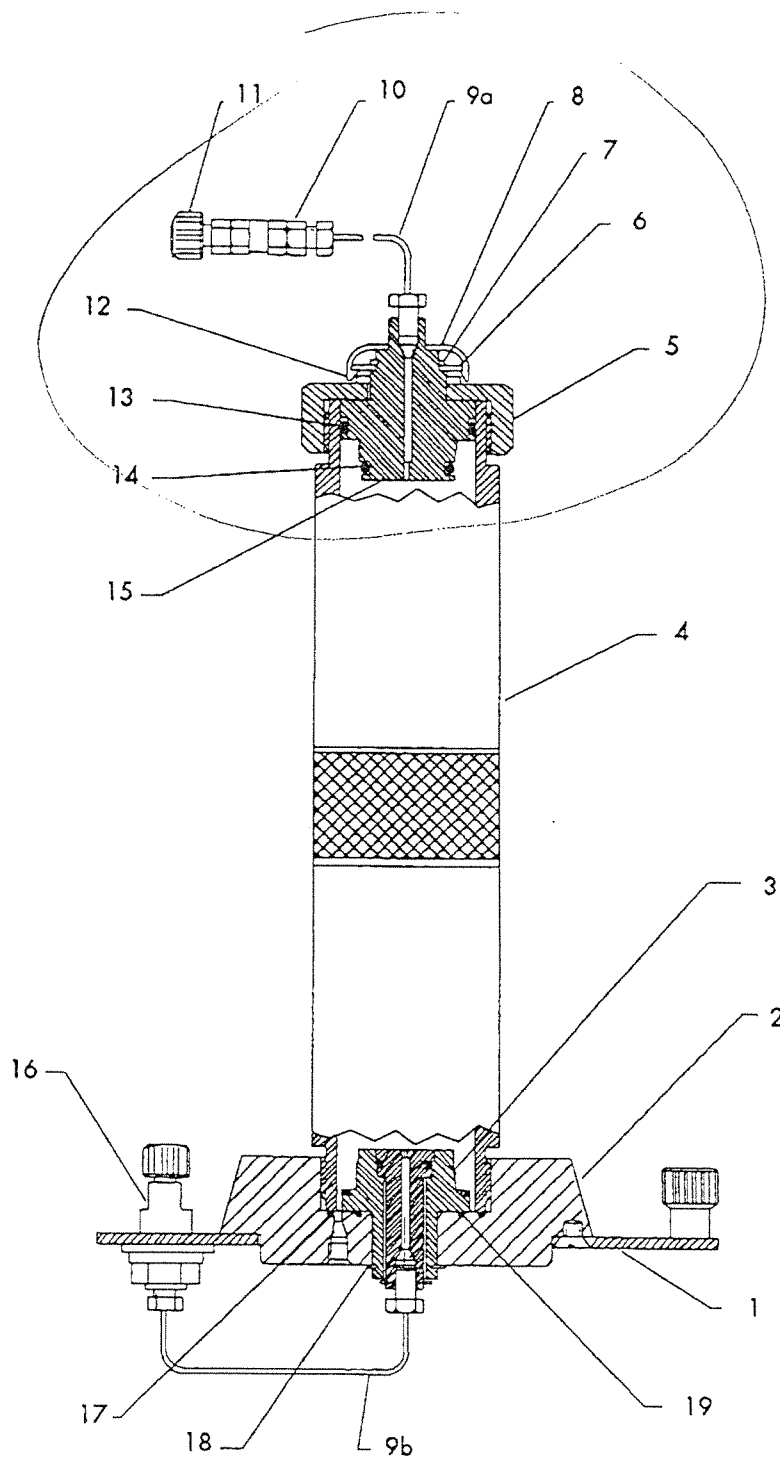
This section is divided into the following procedures:

- Replacing O-rings on the 25 mm Chamber
- Replacing O-rings on the 40 mm Chamber
- Replacing the check valve and filling port O-ring
- Replacing the pressure piston O-ring
- Replacing the pressure gauge

#### **Tools required:**

- Flat blade and Phillips screwdrivers
- 1/4-inch open end wrench
- Two 5/16-inch open end wrenches
- 7/16-inch open end wrench
- 1/2-inch open end wrench
- 3/4-inch open end wrench
- Retaining ring pliers

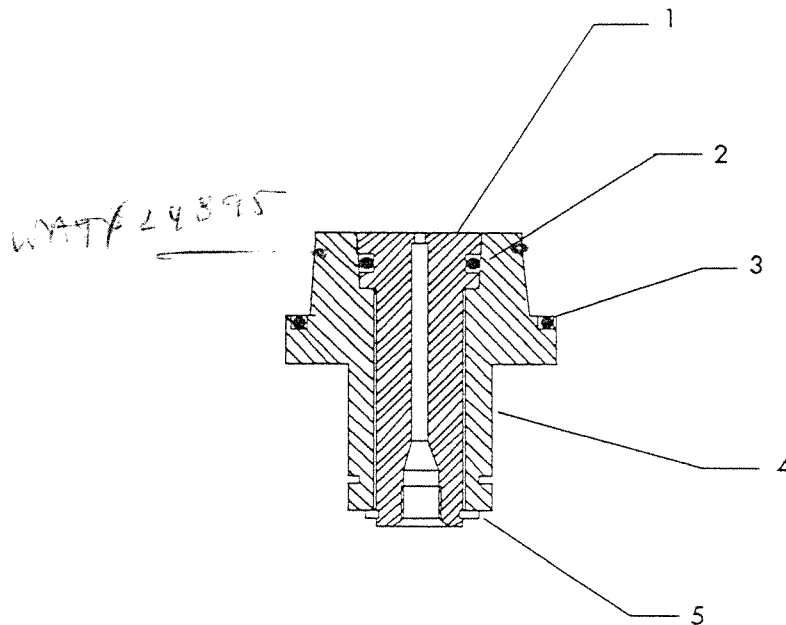
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Figure 5-2: PrepLC 25 mm Chamber Assembly  
(P/N WAT033994)

Item no.	Description	Part no.
1.	Mounting plate	WAT027579
2.	Bottom cap	WAT022190
3.	Lower connector assembly	WAT022357
4.	Chamber, 25 mm	WAT022192
5.	Knob, upper connector	WAT024449
6.	Washer, upper connector	WAT023391
7.	Retaining ring, upper connector	WAT025327
8.	Cap, plastic	WAT033999
9a.	Tubing assembly, upper	WAT024450
9b.	Tubing assembly, lower	WAT024450
10.	Union	WAT089801
11.	Plug, plastic	WAT015674
12.	Washer, upper connector	WAT033942
13.	O-ring, upper chamber	WAT015833
14.	O-ring, upper connector, cartridge seal	WAT024895
15.	Upper connector body	WAT025340
16.	Bulkhead fitting, outlet connector	WAT070194
17.	O-ring, bottom cap, chamber seal	WAT015831
18.	Retaining ring, lower connector	WAT027514
19.	O-ring, bottom cap, lower connector seal	WAT022276
not shown	Extension tubes, O-rings	WAT015831



**Figure 5-3: 25 mm Lower Connector Assembly  
(P/N WAT022357)**

Item no.	Description	Part no.
1.	Inner connector, 25 mm, stainless steel (ss)	WAT022387
2.	O-ring, inner connector seal	WAT024564
3.	O-ring, bottom connector, cartridge seal	WAT024943
4.	Lower connector, HDPE body	WAT022272
5.	Retaining ring, lower connector	WAT022194

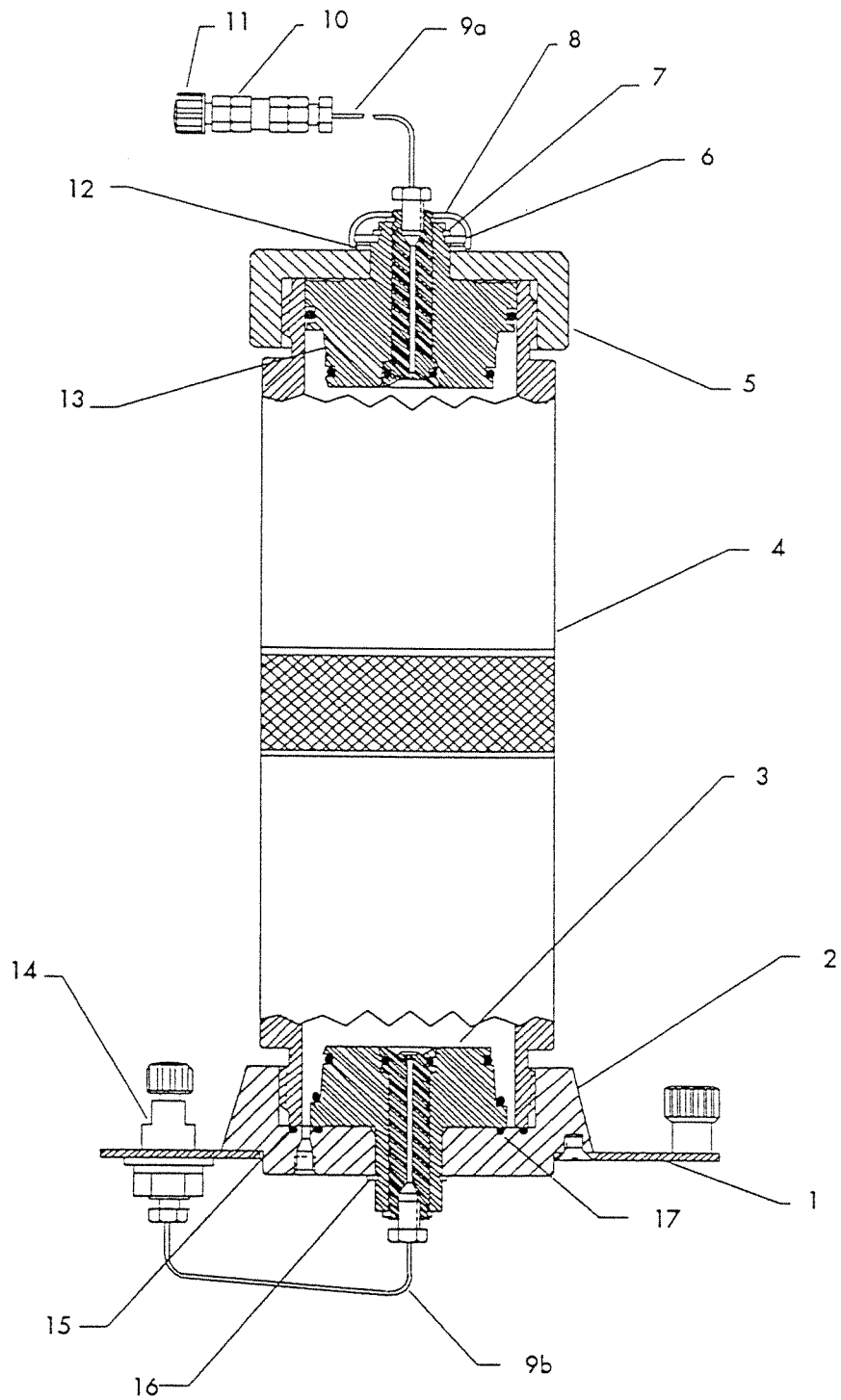


Figure 5-4: PreplC 40 mm Chamber Assembly  
(P/N WAT027578)

Item no.	Description	Part no.
1.	Mounting plate	WAT027579
2.	Bottom cap	<del>WAT022190</del> WAT022191
3.	Lower connector assembly	WAT033943
4.	Chamber, 40 mm	WAT022193
5.	Knob, upper connector	WAT022228
6.	Washer, upper connector	WAT023391
7.	Retaining ring, upper connector	WAT025327
8.	Cap, plastic	WAT033999
9a.	Tubing assembly, upper	WAT024450
9b.	Tubing assembly, lower	WAT024450
10.	Union	WAT089801
11.	Plug, plastic	WAT015674
12.	Washer, upper connector	WAT033942
13.	Upper connector assembly	WAT033944
14.	Bulkhead fitting, outlet connector	WAT070194
15.	O-ring , lower cap, chamber seal	WAT022454
16.	Retaining ring, lower connector	WAT027517
17.	O-ring, bottom cap, lower connector seal	WAT022453
not shown	Extension tubes, O-rings	WAT022454

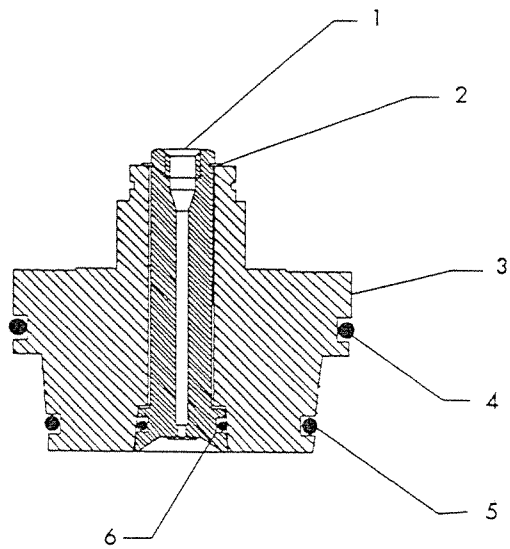


Figure 5-5: 40 mm Upper Connector Assembly  
(P/N WAT033944)

Item no.	Description	Part no.
1.	Inner connector, upper and lower, 40 mm, ss	WAT022388
2.	Retaining ring, inner connector, upper and lower	WAT022194
3.	Upper connector, HDPE body	WAT022271
4.	O-ring, upper chamber	WAT022280
5.	O-ring, upper connector, cartridge seal	WAT024895 ✓
6.	O-ring, inner connector seals, upper and lower	WAT024564

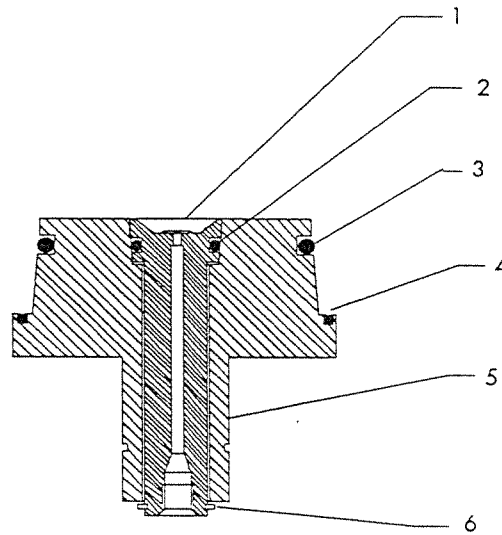
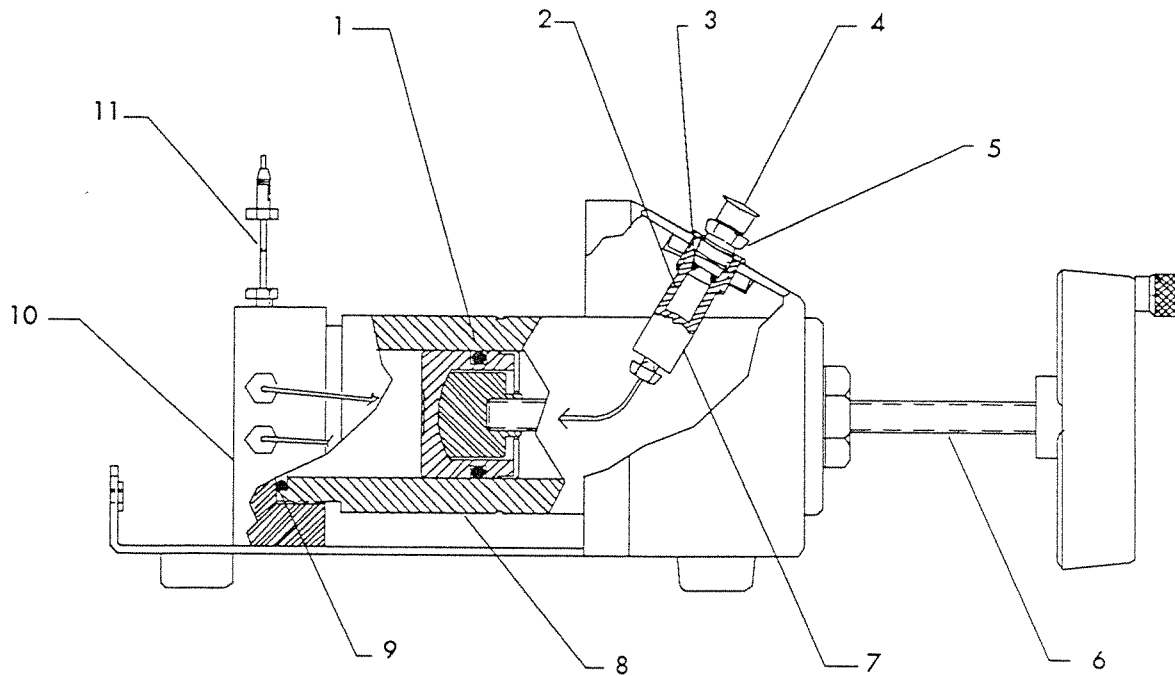


Figure 5-6: 40 mm Lower Connector Assembly  
(P/N EAT033943)

Item no.	Description	Part no.
1.	Inner connector, upper and lower, 40 mm, ss	WAT022388
2.	O-ring, inner connector seal	WAT024564
3.	O-ring, lower connector, cartridge seal	WAT024894
4.	O-ring, lower chamber	WAT022283
5.	Lower connector, HDPE body	WAT022273
6.	Retaining ring, inner connector, upper and lower	WAT022194





**Figure 5-7: PrepLC Universal Base  
(P/N WAT027577)**

<b>Item no.</b>	<b>Description</b>	<b>Part no.</b>
1.	O-ring, pressure piston	WAT022281
2.	Check valve	WAT082888
3.	O-ring, filling port, 10/pk	WAT005129
4.	Filling port plug	WAT027509
5.	Filling port luer adapter	WAT088458
6.	Pressure piston assembly	WAT021969
7.	Fill port housing, check valve	WAT015837
8.	Cylinder, pressure piston	WAT022198
9.	O-ring, pressure piston cylinder seal	WAT021977
10.	Cylinder head, pressure piston	WAT022197
11.	Reservoir-to-chamber tubing assembly, ss	WAT015836
not shown	Pressure gauge assembly	WAT022275