ADVIA® 2400
Chemistry System

ADVIA® 2400 Chemistry System

Maintenance Procedures

Part of the ADVIA® 2400 Operator's Guide
073D0292-02

SIEMENS

5 Maintenance

Maintenance schedule

Perform maintenance procedures at the recommended frequency to maintain the operating efficiency of your analyzer. Procedures marked with an * may require more frequent performance (described in each procedure).

WARNING

The maintenance procedures described in this document are to be performed ONLY by Siemens-trained users. Some of these procedures require the top cover be opened and the probe splash shields removed, exposing the user to biohazard materials and moving parts.

CAUTION

To avoid reporting faulty data, deterioration of reproducibility, or damage to the ISE module and its parts, follow the precautions listed below:

- Immediately clean up any spills or leaks. Repair the source of leaks.
- Do not leave the chloride electrode wet pack open. The electrode dries and becomes inactive.
- Always condition electrodes before first use.

Daily

Clean the probes.
Clean the mixing rods.
Check reagents and system solutions.
Clean the reaction and dilution cuvette washers.
Inspect the cuvette splash covers
Inspect the probe wash cups
Inspect the pumps.
Wipe condensation from the reagent trays.
Perform startup wash.
Perform shutdown or modified shutdown wash.*****
Perform additional ISE wash.*****
Record ISE slopes

Weekly

Perform the weekly wash.*****
Check the lamp coolant level.
Perform lamp energy check.
Perform cuvette blank (cell blank) measurement.
Clean the exterior analyzer panels.

Monthly

Clean the turntable interiors.
Clean or replace reagent containers (47-50).
Clean the dilution bottle.
Clean the cuvette wash bottle.
Clean the chiller filter.

Every 2 Months

Clean the dilution tray cuvettes.
Clean and replenish the cuvette conditioner bottle.

Every 3 Months

Replace the lamp.
Wash the ISE electrode lines.*****

Every 4 Months

Clean the ancillary reagent bottle filters.
Clean the pure-water bottle filters.
Replace the reaction and dilution cuvettes.

As required

Back up system files.
Replace probes.
Replenish the RRV-bath oil bottle.
Perform preventive cleaning of the wash station lines.
Wash all ISE lines (if contaminated).
Condition the ISE electrodes.
Replace ISE electrodes.
Clean the ISE dilution bowl and waste nozzle.
Recover from a power failure.

Daily maintenance

Inspecting and cleaning the probes

Materials required:

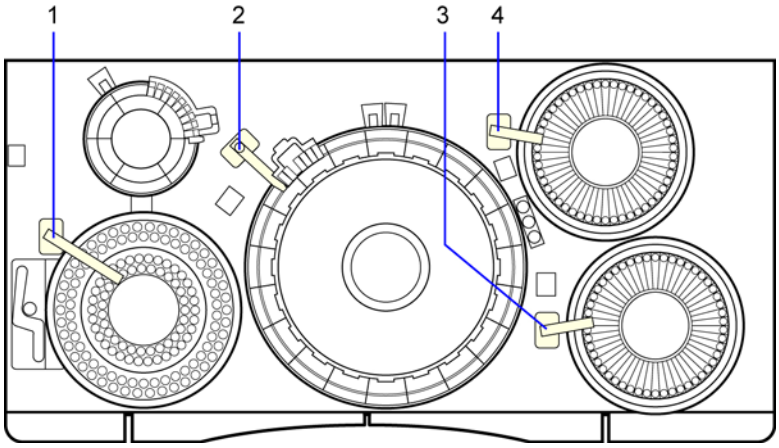
- Phillips screwdriver
- Alcohol prep pad or lint-free towels and 5% bleach solution

Time: 10 minutes
Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

1. Visually inspect each probe daily.



1 Dilution Probe (DPP)
2 Sample Probe (SPP)
3 Reagent Probe 1 (RPP1)
4 Reagent Probe 2 (RPP2)

Figure 5-1 Location of probes

- Replace any clogged probes. See *Replacing the Probes* in the online Operator's Guide.
- Clean all probes daily (proceed to step 2).

TIP

Perform the Shutdown Wash and Weekly Wash as scheduled, to prevent the probes from clogging.

2. Clean each probe using one of the 3 methods described below:

Cleaning the probes using automatic advance probe motion

1. At the Menu Panel, select **Maint**, then select **Manual Operation**.
2. At the Manual Operation window, double-select the **code** for the probe you want to move as follows:

Probe	Code
dilution probe	3.DPPLR
sample probe	16.SPPLR
Reagent probe 1	37.RPPLR-1
Reagent probe 2	49.RPPLR-2

3. Select **Move** the number of times necessary to move the probe to the accessible location, then select **Exit** to close the probe window.

Probe	Accessible Location
Dilution probe (DPP)	Over the sample tray (STT) OR over the ISE
Sample probe (SPP)	Over the dilution tray (DTT)
Reagent probe 1 (RPP1)	Over reagent tray 1 (RTT1)
Reagent probe 2 (RPP2)	Over reagent tray 2 (RTT2)

4. Place a lint-free towel under the probe.
5. Using prep pads or lint-free towels and 5% bleach solution, wipe the probe, then wipe with water.

CAUTION

To avoid bending the probes, do not use excessive force while cleaning,.

NOTE

Verify that the probe ends do not contain any imperfections, which could cause contamination. Replace probes as necessary. Refer to the online Operator's Guide for this procedure.

6. Close the Manual Operation window, then select **Yes** when prompted.
7. At the Operation Panel, select **Initialize** to return all probes to the home position (over the wash cups).
8. After cleaning, ensure that no threads or fibers are left on the probes.
9. Verify the analyzer mode is READY before performing any further actions.

Cleaning the probes using manual probe motion

1. Put the system in Standby mode.

CAUTION

If you are performing this procedure with the power off, manually support (lift) the probe to avoid damaging the probe tip. Be careful not to strike the probe against other components on the analyzer.

2. Lift and manually rotate the probe arm to an accessible location.

   The movement may feel a bit awkward and tight.

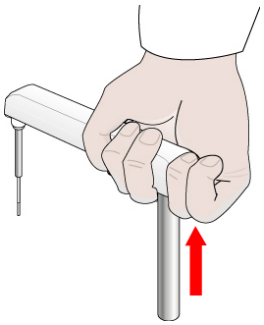


Figure 5-2. Manually adjusting probe

Probe	Accessible Location
Dilution probe (DPP)	Over the sample tray (STT) OR over the ISE
Sample probe (SPP)	Over the dilution tray (DTT)
Reagent probe 1 (RPP1)	Over reagent tray 1 (RTT1)
Reagent probe 2 (RPP2)	Over reagent tray 2 (RTT2)

3. Place a lint-free towel under the probe.
4. Wipe the probe with prep pads, then wipe3 with water.

 **CAUTION**

To avoid bending the probes, do not use excessive force while cleaning .

5. Manually move the probe in position over the probe wash cup but not into the wash port.
6. At the Operation Panel, select Initialize to return all probes to the home position (over the wash cups).
7. Ensure that no threads or fibers are left on the probes.
8. Verify the analyzer mode is READY before performing any further actions.

Probe cleaning procedure (optional method)

IMPORTANT

You can use this procedure only after you remove the wash covers.

1. Select **Maint**.
2. Select **User Maintenance**.
3. At the User Maintenance window, in the Position Probe for Routine Cleaning area, select **Start**, then select **Yes** when prompted.
4. Wipe the probe with prep pads or lint-free towels and 5% bleach solution.

5. Check the alignment of the probe to the cuvette.

   If the probe is not centered over the cuvette, call your local technical support provider or distributor.

6. Close the User Maintenance window, then select **Yes** when prompted.
7. At the Operation Panel, select **Initialize** to return all probes to the home position (over the wash cups).
8. Verify that the analyzer mode is READY, before performing any further actions.

Inspecting and cleaning the mixing rods and mixer wash cups

Materials required:

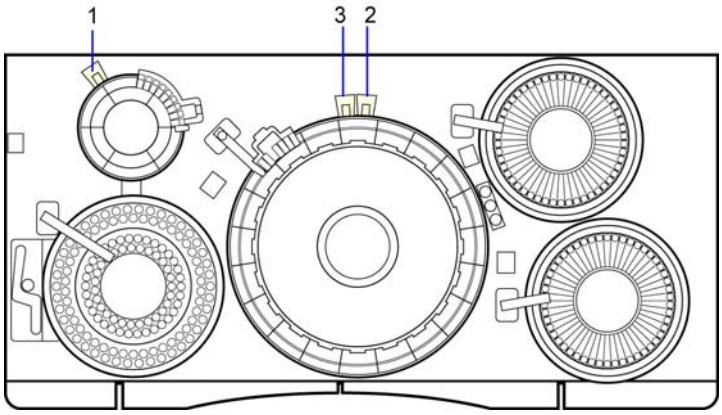
- Lint-free towel
- Deionized water
- Cotton-tipped applicators

Time: 5 minutes

Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.



1 Dilution Mixer
2 Reagent Mixer1
3 Reagent Mixer2

Figure 5-3. Mixing rods

1. Visually inspect each mixing rod and mixer wash cup for cleanliness.
2. Clean any dirty mixing rods or wash cups to avoid contamination of the mixers, which results in carryover:

   a. With the instrument in the READY state, visually verify each mixing rod is at its upper limit.

   b. Using lint-free towels moistened with deionized water, wipe the mixing rod.

CAUTION

Do not use excessive force while cleaning, to avoid bending the mixing rods.

3. Inspect the mixing wash cups for cleanliness, then clean if dirty:

   a. Pour deionized water into the mixer wash cup.

b. With lint-free towels and cotton-tipped applicators, clean the mixer wash cup.

CAUTION

Do not apply excessive force while cleaning, to avoid damaging the sensor.

4. Ensure that no threads or fibers are left on the mixing rods after cleaning.

   NOTE

   If an overflow error message displays, water is probably on the sensor. Dry the sensor.

   To clear the alarm message, on the Operation Panel, select the alarm icon.

Checking reagents and system solutions

Refer to page 73, *Checking the availability of the reagents and wash solutions*, in the Operating the System section in this manual or, for more detail, refer to the online Operator's Guide.

Inspecting and cleaning the reaction (WUD) and dilution (DWUD) cuvette washers

Materials required:

- Lint-free towel
- Alcohol prep pads or lint-free towels and 5% bleach solution
- 4-mm hex wrench

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Time: 10 minutes

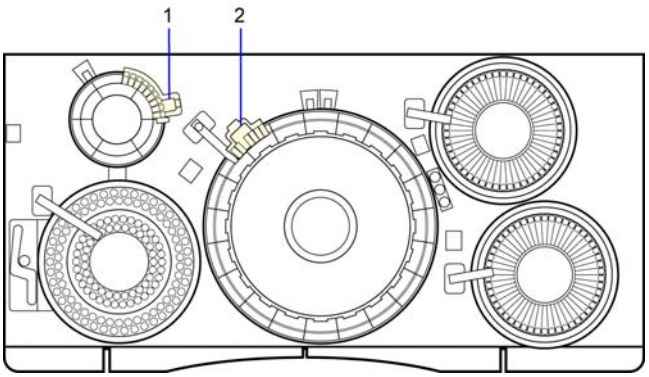
Analyzer mode: READY

1. Inspect the exterior of the reaction cuvette washer (WUD) and dilution cuvette washer (DWUD) tubing for cleanliness.
2. Check the WUD and DWUD for leaks.

   TIP

   Perform this inspection in addition to the startup, shutdown, and weekly washes, to keep the WUD and DWUD from clogging.

   In the event of a clog, call your local technical support provider or distributor for assistance.



1 Dilution Cuvette Wash Station (DWUD)

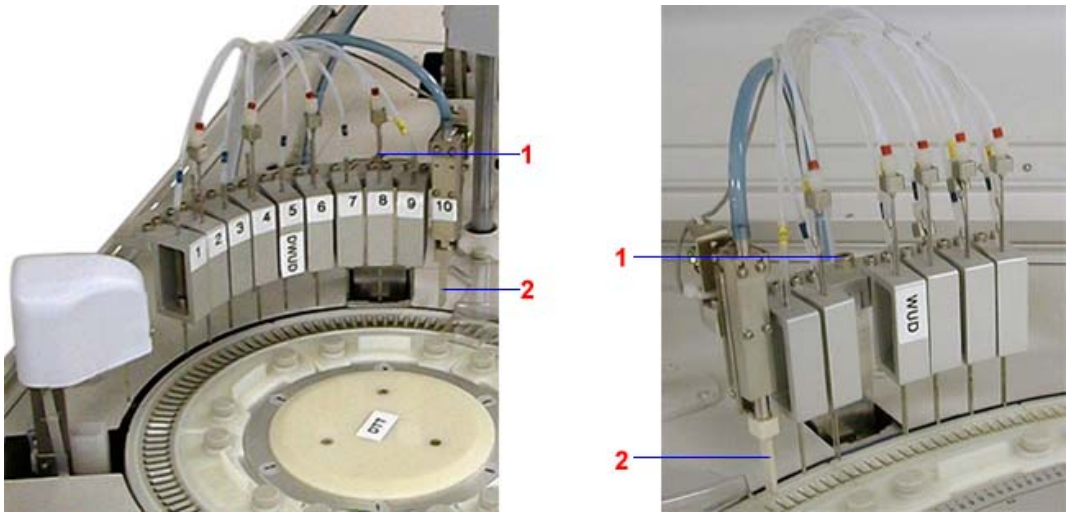
2 Reaction Cuvette Wash Station (WUD)

Figure 5-4. Cuvette wash stations

3. Remove the wash head:
   a. Cover nearby cuvettes with lint-free toweling to protect them from dust.
   b. Loosen the retaining screw (**1**) with a 4-mm hex wrench.
   c. Lift the wash head from the wash station assembly.

CAUTION

Ensure that the tubes remain connected to the ports. Use care not to crimp the tubing.



Dilution cuvette wash station (DWUD)

Reaction cuvette wash station (WUD)

Figure 5-5. DWUD and WUD wash stations

4. Look for signs of wear or damage to the drying nozzle (**2**).

   If wear or damage is present, call your local technical support provider or distributor.

5. Witith prep pads or lint-free towels soaked in 5% bleach solution, wipe eachwash head nozzle and inspect the pipet and tubing for clogs. If clogs are present,manually dislodge them by feeding the wire stylet, found in the maintenance toolkit, through the pipet or tube. Check that the three pipes in each nozzle move smoothly against the spring tension.

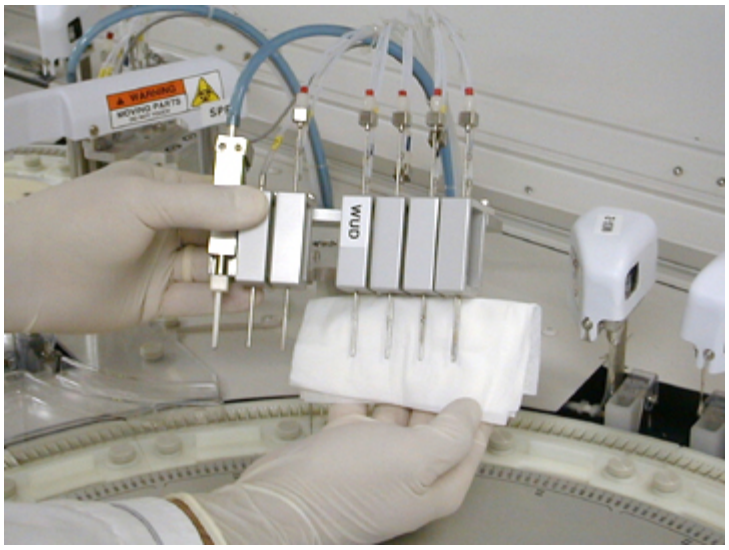


Figure 5-6. Wiping the wash stations with lint-free towels

6. Reinstall the wash head:
   a. Replace the wash head using the alignment pins located on either side of the retaining screw, then tighten the 4-mm hex screw.
   b. Ensure that all tubes are securely connected.
   c. Remove the toweling.
   d. Ensure that each nozzle is centered above the corresponding cuvette.
7. At the Operation Panel, select Initialize and verify the the DWUD and WUD are in the up position and that the analyzer is in READY mode.
8. Verify the wash head nozzles are correctly centered in the cuvettes:
   a. At the Menu Panel, select **Maint**, then select **Manual Operation**.

      For additional information concerning the Manual Operation window, refer to the Manual Operation window in the online Operator's Guide.
   b. At he Manual Operation window, double-select **14.DWUD** or **23.WUD**.
   c. Select **Move** to slightly lower the washer nozzles, then verify that they are correctly positioned.

      If not, call your local technical support provider or distributor.
   d. Verify the nozzles are correctly centered.
   e. At the DWUD or WUD window, select **Init**., then select **Exit** to raise the washer nozzles.
9. At the Operation Panel, select **Initialize**, then verify the DWUD and the WUD are in the up position and the instrument is in the READY state.

Inspecting and cleaning the cuvette splash covers

Materials required:

- Lint-free towel
- Deionized water

Time: 5 minutes

Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

NOTE

Cuvette covers are installed around the probes to prevent water and reagent from entering the dilution and reaction cuvettes.

1. Inspect the cuvette covers for spills and splattering.

   If there is any splattering is on the cuvette covers (**1**), proceed to step 2.

Figure 5-7. Cuvette covers

2. Using lint-free towels moistened with deionized water, wipe down the covers.

WARNING

Do not touch probes or mixing rods, to avoid contamination.

3. If splattering is extensive or enters the cuvettes, call your local technical support provider or distributor.

Inspecting and cleaning the probe wash cups

Materials required:

- Phillips screwdriver
- Lint-free towel
- Deionized water

Time: 5 minutes

Analyzer mode: READY

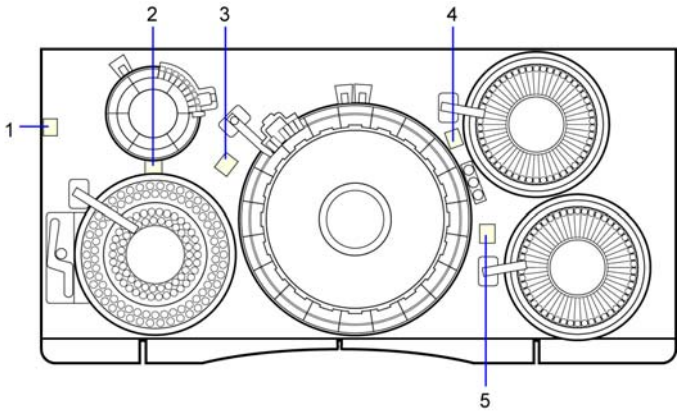
BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

NOTE

Keep the probe wash cups clean to ensure proper cleaning of the probe.

Clean any wash cups that fail the daily visual inspection for cleanliness.



1 Dilution Probe Wash Port 2 (LAS)
2 Dilution Probe Wash Port 1
3 Sample Probe Wash Port
4 Reagent Probe 2 Wash Port
5 Reagent Probe 1 Wash Port

Figure 5-8. Wash ports

1. Visually inspect each probe wash cup for cleanliness.

   If any of the probe wash cups appear dirty, clean them as described in the following steps.

2. At the Menu Panel, select **Maint**, then select **User Maintenance**.
3. At the User Maintenance window area labeled Probe posi.adjust., select **Position adjust start**.

   All probes move to the cuvette positions, allowing access to the wash ports. The operating mode display on the Operation panel indicates that the instrument is in the WAIT state. For additional information, see the User Maintenance window in the online Operators Guide.

4. Pour deionized water into the wash cups and overflow sensor unit, then clean and dry these areas with lint-free towels.

CAUTION

Do not apply excessive force while cleaning the overflow sensor, to avoid damaging it. If an overflow error message appears, there is probably water on the sensor. Dry the sensor.

   To clear the alarm message, on the Operation Panel, select the alarm icon.

5. At the Operation Panel, select **Initialize** to return the system to READY mode.

Checking pumps for leaks

A decrease in liquid flow or the presence of air bubbles in the lines may be due to a leaking pump. Inspect the pumps for leaks daily to identify potential problems.

Materials required:

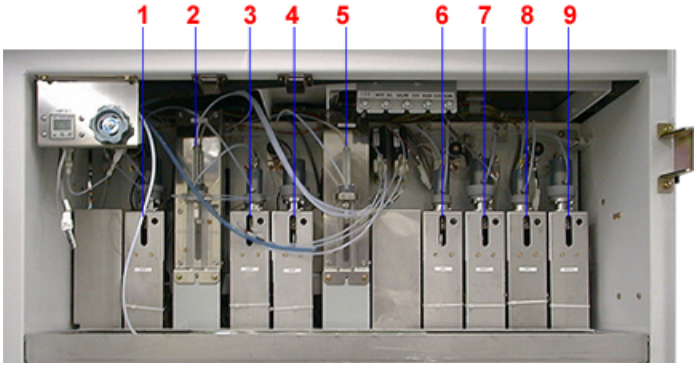
- Lint-free towel

Time: 10 minutes

Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.



1 DCP
2 DIP
3 DOP
4 SCP
5 SP
6 RP-1
7 RWP-1
8 RP-2
9 RWP-2

Figure 5-9 Vertical pumps

Checking the SP and DIP vertical pumps for leaks

Liquid leaking from the seal on the sampling pump (SP) or the dilution aspiration pump (DIP) flows to the drive lever unit. If the drive lever unit is wet, the pump seal must be replaced.

1. Closely inspect the plastic cylinder (**1**) for moisture.

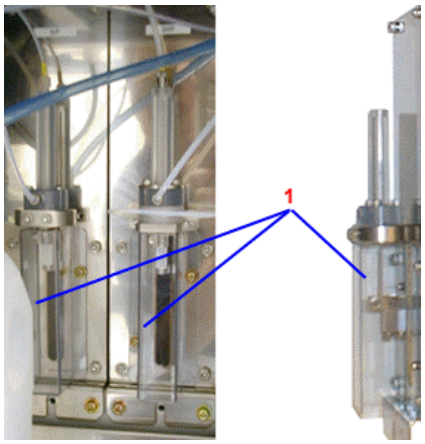


Figure 5-10 Sp and DIP vertical pumps

2. To replace the pump seal if the drive lever unit is wet, call your local technical support provider or distributor.

Checking other vertical pumps for leaks

Use this procedure to test for leaks from other vertical pumps: the sampling wash pump (SCP), dilution wash pump (DCP), dilution discharge pump (DOP), reagent dispensing pumps (RP1 and RP2), and reagent wash pumps (RWP1 and RWP2).

1. To determine if any of these pumps are leaking, inspect the upper portion (**1**) (cylinders, L-ring holders, tubes and fittings) of the vertical pumps.

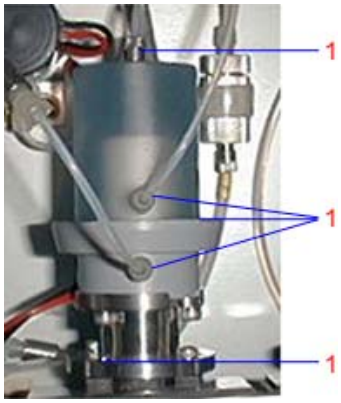
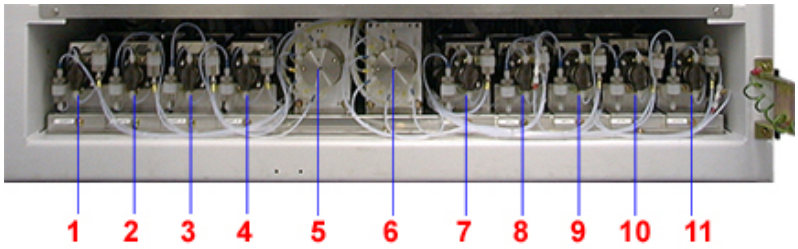


Figure 5-11. Typical vertical pump

2. If the pump is leaking, you must replace the pump seal. To replace the pump seal, call your local technical support provider or distributor.

Checking the horizontal pumps for leaks

Horizontal pumps consist of the dilution cuvette wash pumps, DWP1, DWP2, DWP3 and DWP4; the reaction cuvette wash pumps, WP1, WP2, and WP3; and reaction cuvette detergent pumps DTP1 and DTP2).



1	DWP1	**5**	WCV2	**9**	WP3
2	DWP2	**6**	WCV1	**10**	DTP1
3	DWP3	**7**	WP1	**11**	DTP2
4	DWP4	**8**	WP2		

Figure 5-12. Horizontal pumps

There are two types of horizontal pumps, those with double seals and those with a single seal. The method of checking for leaks is the same for both:

1. To determine if any of these pumps are leaking, inspect the front portion (**1**).

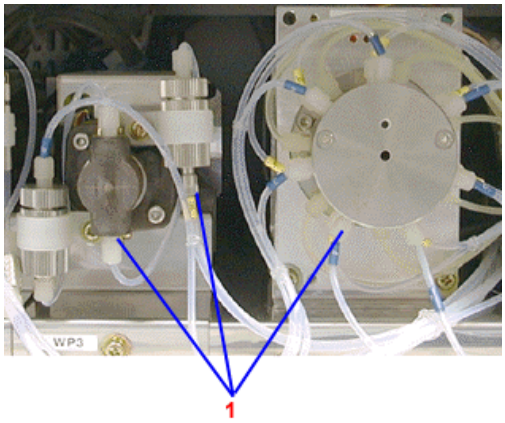


Figure 5-13. Typical horizontal pump

2. If there is a leak, the seal(s) must be replaced. To replace the seals, call your local technical support provider or distributor.

Performing the startup wash (WASH3)

Materials required:

- Deionized water

Time: 26 minutes

Analyzer mode: READY

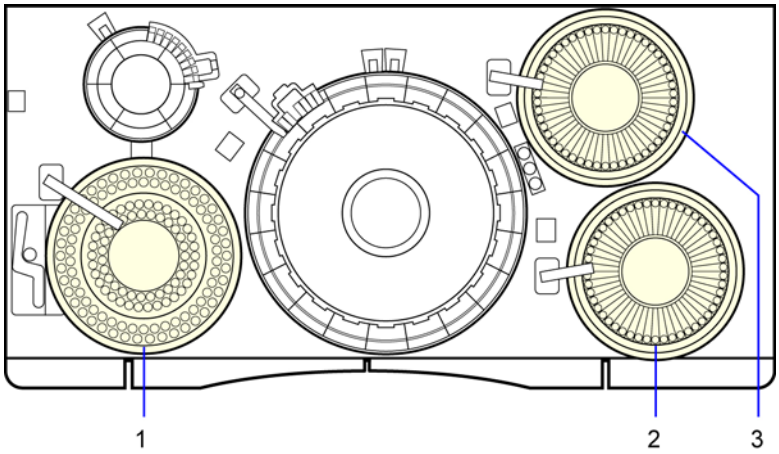
BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

The daily startup wash rinses the probe lines, reaction cuvettes and dilution cuvettes.

NOTE

Laboratories running the system more than 8 hours per day are advised to **perform this procedure once per shift**.



Location	Position	Wash Solution
1	CTT-15	ISE Detergent Solution
1	CTT-16	Deionized water
1	CTT-49	10% Cuvette Wash Solution (Daily) 5% Reagent Probe Wash 3 (Weekly)
1	CTT-50	Deionized water
1	CTT-51	Deionized water
2	RTT1-47	Reagent Probe Wash 1
2	RTT1-48	Reagent Probe Wash 2
2	RTT1-49	10% Cuvette Wash Solution (Daily) 5% Reagent Probe Wash 3 (Weekly)
2	RTT1-50	Deionized water
3	RTT2-47	Reagent Probe Wash 1
3	RTT2-48	Reagent Probe Wash 2
3	RTT2-49	10% Cuvette Wash Solution (Daily) 5% Reagent Probe Wash 3 (Weekly)
3	RTT2-50	Deionized water

Figure 5-14. Location of wash solutions on the CTT and RTT trays

1. At the Operation Panel, select **Wash**.
2. Ensure the 10-mL tube at CTT (**1**) position #51 contains DI water.

   TIP

   By choosing CTT position #50 for WASH 2 and CTT position #51 for WASH 3, you only need to refill the CTT container once.
3. Ensure the container at RTT1 (**2**) and RTT2 (**3**) position #50 contains DI water.

NOTE

At your laboratory's discretion, you may use other positions for the washes on each of the trays, but you must change the entries for the alternate positions in the appropriate fields on the WASH Set window.

4. At the WASH Set window, define the WASH3 container positions as follows:
   a. Select **WASH3**.
   b. Select **1** for Cycles.
   c. Type **51** in the CTT cup position 1st time field.
   d. Type **50** in the RTT1 and RTT2 bottle position 1st time field.
5. Select **Execute**.

Performing the shutdown wash

Materials required:

- 10% solution of Cuvette Wash Solution (REF 00195330, PN B01-4178-01)
- Deionized water
- ISE Detergent (REF 01307361, PN B01-4174-01)

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Time: 38 minutes

Analyzer mode: READY

The daily shutdown wash uses a detergent to clean the probe lines, reaction and dilution cuvettes, and ISE components.

NOTE

Laboratories running only urine samples or those running the system more than 8 hours per day are advised to perform the Weekly wash procedure in place of this Shutdown wash procedure.

For location of washes on the CTT and RTT trays, refer to Figure 5-14.

1. At the Operation Panel, select **Wash**.
2. Ensure the 10-mL tube at CTT (**1**) position #49 contains a 10% solution of Cuvette Wash Solution, the cup at CTT position #16 contains pure water and the cup at CTT position 15 contains ISE detergent.
3. Ensure the bottle at RTT1 (**2**) and RTT2 (**3**) position #49 contains a 10% solution of Cuvette Wash Solution.
4. Ensure the 10-mL tube at CTT (**1**) position #50 contains DI water.
5. Ensure the bottle at RTT1 (**2**) and RTT2 (**3**) position # 50 contains DI water.

   NOTE

   At your laboratory's discretion, you may use other positions for the washes on each of the trays, but you must change the entries for the alternate positions in the appropriate fields on the WASH Set window.

6. At the WASH Set window, define the WASH2 container positions as follows:
   a. Select **WASH2**.
   b. Select **2** for Cycles.
   c. Enter **49** in the CTT cup position 1st time field and **50** in the CTT cup position 2nd time field.
   d. Enter **49** in the RTT1 and RTT2 cup positions 1st time fields and **50** in the RTT1 and RTT2 cup positions 2nd time fields.
   e. Select **Execute**.

Performing additional ISE electrode washes

Materials required:

- ISE Detergent Solution (REF 01307361, PN B01-4174-01)

Time: 5 minutes

Analyzer mode: Manual operation

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

ISE Detergent Solution is automatically run through the ISE module as part of the shutdown wash procedure (WASH2). Manually perform additional ISE washes (described in the following procedure) **once per shift under either of the following conditions**:

- Dialysis samples are run routinely.
- The system is run more than 8 hours per day.

NOTE

Do NOT perform the ISE electrode wash more than 3 times per day (once as part of the shutdown wash and twice on a per shift basis). Pour fresh ISE Detergent into a cup, not a tube, before each wash, from the CTT.

1. At the Menu Panel, select **Maint.**, then select **ISE Operation**.
2. In the Period.wash area, select **OFF**, then select **Set**.
3. At the Wash Electrode area, type the position number of the ISE Detergent container in the Detergent posi. field.
4. In the Container field, select the type of container for the wash solution.

   The recommended type of container is **6 : 2mlCUP/Adp.**

5. Pour ISE Detergent Solution in the container and place it in the CTT position entered in step 3.
6. In the Wash Electrode area, select **Execute**, then select **Yes** when prompted.
7. At the ISE Operation window, in the Period.wash area, select **ON**, then select **Set**.
8. Close the window, then select **Yes** when prompted.

Recording ISE slopes

Once a day, record the slopes from a successful ISE calibration on the Maintenance Log. The slopes are provided on the ISE Monitor, RBL/Calibration History, and RealTime Monitor windows following a successful calibration.

Weekly maintenance

Performing the weekly wash

Materials required:

- 5% solution of Reagent Probe Wash 3 (REF 03164495, PN B01-4183-01)
- ISE Wash (REF 01307361, PN B01-4174-01)
- Deionized water

Time: 38 minutes

Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Laboratories running the system more than 8 hours per day or running large numbers of dialysis or urine samples are advised to perform this Weekly wash procedure **Daily**, in place of the Shutdown wash procedure. The Weekly Wash is the same as the Daily Shutdown Wash, except that a 5% solution of reagent probe wash 3 is substituted for 10% cuvette wash solution.

NOTES

The daily shutdown wash does not need to be performed on the day you perform the weekly wash. When performing weekly maintenance, be sure to perform the procedures in the following sequence:

1. Weekly wash (this procedure)
2. Lamp energy check
3. Cuvette blank measurement

For location of washes on the CTT and RTT trays, refer to Figure 5-14.

1. At the Operation Panel, select **Wash**.
2. Ensure the 10-mL tube at CTT position #49 contains a 5% solution of Reagent Probe Wash 3, the cup at CTT position #15 contains ISE Detergent, and a 10-mL tube of pure water is at CTT position #16
3. Ensure the bottle at RTT1 and RTT2 position #49 contains a 5% solution of Reagent Probe Wash 3.
4. Ensure the bottle at RTT1 and RTT2 position #50 contains DI water.

   NOTE

   At your laboratory's discretion, you may use other positions for the washes on each of the trays, but you must change the entries for the alternate positions in the appropriate fields on the WASH Set window.
5. At the WASH Set window, define the WASH2 container positions as follows:
   a. Select **WASH2**.
   b. Select **2** for Cycles (the default setting).
   c. Type **49** in the CTT cup position 1st time field and **50** in the CTT cup position 2nd time field.

d. Type **49** in the RTT1 and RTT2 cup positions 1st time fields and **50** in the RTT1 and RTT2 cup positions 2nd time fields.

6. Select **Execute**.
7. After the wash, check the lamp energy and run the cell blank measurement test.

NOTE

Perform the lamp energy check and cuvette blank measurement only once a week, even if the weekly wash is run daily.

Checking and replenishing the lamp coolant

Materials required:

- Lamp coolant additive (REF 04533710, PN B01-4496-51)
- Deionized water

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Time: 5 minutes

Analyzer mode: READY

The lamp is cooled by circulating liquid coolant. As the volume of coolant decreases, the heat of the lamp increases.

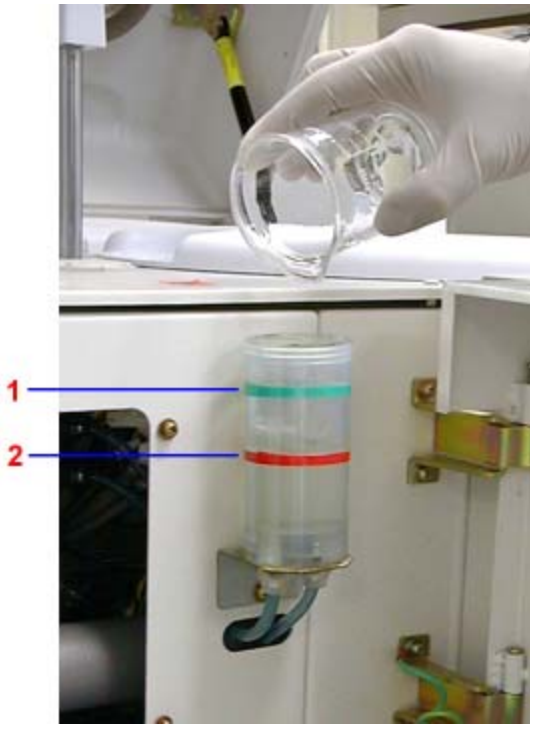
NOTE

Check the lamp coolant level daily and whenever the system generates a lamp coolant warning and turns off the lamp.

1. Open the upper right front door to gain access to the lamp coolant reservoir.
2. Check the fluid level in the reservoir.

   If the level is between the lower and upper marks, proceed to step 4.

3. If the reservoir fluid level is less than 5 cm, add coolant as follows:
   a. Turn the reservoir cover counterclockwise to remove it.
   b. Fill the reservoir to the 9-cm mark with a 5% solution of Lamp Coolant Additive (REF 04533710, PN B01-4496-51) in deionized water.



1 Upper Mark (Green Line)
2 Lower Mark (Red Line)

Figure 5-15. Reservoir levels Upper and Lower

c. Replace the reservoir cover. Do not over tighten.

4. Replace the lamp access cover.

NOTE
If adding coolant does not clear the lamp coolant warning, call your local technical support provider or distributor.

Checking lamp energy

NOTES
Check the lamp energy after cleaning or replacing cuvettes, and after replacing the lamp.

When completing weekly maintenance, be sure to perform the procedures in the following sequence:

1. Weekly wash
2. Lamp energy check (this procedure)
3. Cuvette blank measurement

Materials required:

No materials required

Time: 15 minutes

Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

IMPORTANT
Do not touch or turn the reaction tray at any time during the lamp energy check procedure. The reaction tray should turn freely. If the reaction tray is shifted, repeat the procedure, since a shift could result in an erroneous lamp energy reading.

1. At the Menu Panel, select **Maint**, then select **Lamp Energy Monitor**.

   The Lamp Energy Monitor window displays.

2. Ensure the bottle at position #50 in Reagent Tray 1 (RTT1) contains deionized water.
3. Select **Check Energy**.

   The Lamp Energy Monitor dialog box displays.

4. Type **50** in the RTT1 bottle posi. field, then select **3: 70 mL** for the Container field.
5. Select **Meas. Start**.
   - The reagent probe aspirates deionized water from RTT1 and dispenses it into reaction cuvette #1.
   - The reaction disk rotates until cuvette #1 is in the detection position.
   - The Operation window displays Lumi.Check and then WAIT.

   NOTE
   Perform steps 6 - 10 while in the WAIT state.

6. At the Lamp Energy Monitor window, in the Luminous Energy Check area, enter the settings:
   a. Type **1000** in the Meas. times field.

      Enter the number of times to measure the lamp energy (normal setting: 1000).

   b. Type **100** in the Meas. cycle field.

      Enter the time (in µs) to elapse after each lamp energy measurement (normal setting: 100).

   c. Select **AD**.
   d. Select **Auto.**
7. Select **Meas. Energy**.

   The message, "Execute the lamp energy check?" displays.

8. Select **OK**.
9. On the Lamp Energy Monitor window, select **Collect Data**.
10. Calculate the scatter plot:
    a. Note the value of the 340-nm AD count field.
    b. Add 50 to the 340-nm AD count and type the sum in the top field to the left of the graph, then select **Enter**.
    c. Subtract 50 from the 340-nm AD count (**noted in step 10 a**) and type the difference in the bottom field, to the left of the graph, then press **Enter**.

The lamp energy displays as a scatter plot.

- If the points are mostly within ±40 of the center, the lamp is normal.
- Otherwise replace the lamp

11. **Only** if you replaced the lamp or a cuvette segment, select **Regist Data**, then select **OK** in the Registration window.

    If not, proceed to step 12.

    NOTE

    The system uses the data from the lamp energy data registration as the comparison standard for the next calculation of the attenuation ratio.

12. Exit the Lamp Energy Monitor window, then select **Initialize** to switch the system from the WAIT state to the READY state.
13. Run cell blank measurement.

Reading lamp energy data

1. Execute the lamp energy check and acquire the data.
   - A graph displays at the window.
   - The lamp energy check data displays to the left of the graph.
2. Select a wavelength for which to display data.
3. Display the voltage or the AD value.
4. (Optional) Change the vertical scale of the graph.

Measuring cuvette blanks

When performing weekly maintenance, be sure to perform the procedures in the following sequence:

1. Weekly wash
2. Lamp energy check
3. Cuvette blank measurement (this procedure)

Materials required:

- No materials required

Time: 20 minutes

Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

Reaction cuvettes undergo changes in absorption with use. After the weekly wash, perform the cuvette blank measurement to determine the change. The cuvette blank is only run weekly, even if your lab runs the Weekly Wash as a daily procedure.

1. At the Menu Panel, select **Maint**, then select **User Maintenance**.
2. In the Cell blank meas.check area, select **Start CB**.

   The measured cuvette blank values for 221 cuvettes and a list of abnormal cells are printed in approximately 15 minutes.

3. To save the data, select **Yes**.
4. Evaluate the results:
   - 17 cuvette cells are in each cuvette set. Replace cuvette sets when 4 or more cells in a set are flagged abnormal.

     NOTE
     An abnormal cuvette is defined as any cuvette with an **H**, **L**, or **N** flag.

   - If all the cells fail, replace the lamp.
5. If required, reprint the results.
6. Retain the statistical results and abnormal cell blank list printout with laboratory records.

Cell blank measurement results

Printed data

The printed data is the OD (optical density) value X 1000. Each cell has two values and a mean value.

Abnormal cuvettes

A list containing abnormal cuvettes is printed as part of the cell blank. The list contains marks indicating abnormality. Cuvettes on the list are not used for analysis. Abnormal cuvettes have the following characteristics:

- Cuvettes exceeding the cell standard value (set in the System Parameters System window) are marked "H" or "L."
- Cuvettes exceeding the cell breakup limit value (set in the System Parameters Settings window) are marked "N."
- Cuvettes exceeding the skip absorbance value (set in the System Parameters Settings window) are skipped (marked **E**), and therefore not used for analysis.
- Cuvettes exceeding the lamp energy voltage limits are skipped (marked U or D), and therefore not used for analysis.
- Abnormal cuvettes remain registered as abnormal until a future measurement determines that they can be used.

Reference value

The reference value (the average value of the measurements of all cuvettes) remains the same until the next measurement.

Cleaning the analyzer and rack handler exterior panels

Materials required:

- Lint-free towel
- 10% solution of bleach (5% sodium hypochlorite) and water

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Time: 10 minutes

Analyzer mode: READY

1. Put the analyzer and rack handler (if applicable) in Standby mode.
2. Turn off the 30-A power switch at the back of the system.

WARNING

Turn off the main power switch at the back of the analyzer, to avoid catching the toweling in the cooling fans.

3. Close the analyzer cover.
4. Prepare a 10% solution of bleach and DI water.
5. Dampen lint-free towels with the solution and wipe the following exterior surfaces:
   - top cover
   - side panels
   - front panel
   - bear panel
6. Using deionized water, wipe the exteriors again.
7. Turn on the 30-A power switch at the back of the system.
8. Return the system to the Operating mode and the rack handler to the ON mode (if applicable).

Monthly maintenance

Cleaning the turntable interiors (STT/CTT and RTT)

Materials required:

- Phillips screwdriver
- Lint-free towels

Time: 10 minutes

Analyzer mode: READY

BIOHAZARD

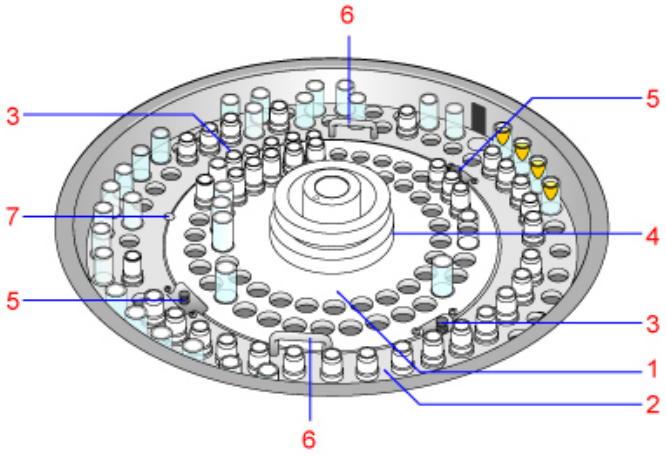
Wear personal protective equipment.
Use universal precautions.

NOTE

Use the 2 procedures that follow to clean inside the STT/CTT housing and the RTT1 and RTT2 refrigerated housing to remove accumulated sample, reagent, dust, and other materials.

Cleaning the inside of the STT/CTT housing

1. Remove the Calibrator/Control Tray loader (CTT):
   a. Lift the standard cover from the loaders..
   b. Pull up on the two Nylatch fasteners (**3**) securing the CTT Tray loader in place.
   c. Lift out tray loader by the center handle (**4**).
2. Remove the Sample Tray loader (STT):
   a. Lift the Sample Tray evaporation cover.
   b. Pull up the two fasteners (**5**) securing the STT Tray loader in place.
   c. Lift out the STT tray by the two metal handles.
3. Using lint-free towels, wipe the interior of the STT and CTT housings.



1 CTT Tray
2 STT Tray
3 CTT Nylatch Fasteners - 2 places
4 CTT Handle
5 STT Nylatch Fasteners - 2 places
6 STT Handles - 2 places
7 Locator Screw

Figure 5-16. Components of CTT and STT trays

4. Replace the CTT and STT tray and covers.
    a. Orient each tray loader to the locator screw (**7**).
    b. Ensure the tray loaders are securely in position, then push the fasteners (**3** and **5**) in place.
    c. Replace the STT evaporation cover.
    d. Replace the CTT cover.

Cleaning the inside of the reagent tray refrigerated housing

1. Remove Reagent tray loader 1 (RTT1):
    a. Lift and remove the cover from the reagent tray.
    b. Loosen the white knob by turning it counterclockwise.
    c. Lift the loader out of the refrigerated housing.
2. Using lint-free towels, wipe the interior of the refrigerated housing and clean the glass window of the reagent bar code reader.
3. Replace the reagent tray loader.
    a. Ensure that it is securely in position.
    b. Tighten the white center knob.
    c. Replace the covers, aligning the hole in the cover with the locating pin.
4. Repeat steps 1-3 for RTT2.

Cleaning or replacing the wash solution reagent containers (47 – 50)

Materials required:

- 5 reagent wedges, empty, 70-mL (optional)
- Probe Wash 1
- Probe Wash 2
- 10% Cuvette Wash solution
- 5% Probe Wash solution

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Time: 10 minutes

Analyzer mode: READY

1. Remove the wash solution reagent containers from RTT1 and RTT2, positions 47 – 50.
2. Replace the containers with new ones or clean the old containers with DI water.
3. Refill the containers with fresh solutions as specified in the table below.

RTT1/2 Position	Wash Solution
47	Probe Wash 1
48	Probe Wash 2
49	10% Cuvette Wash
50	DI Water

Cuvette wash and cuvette conditioner usage

CTT and RTT

Solution	Approximate Volume Used During Wash 2	Number of Aspirations	Total number of WUD cycles for Wash2
10% Cuvette Wash	DPP = 3.6 mL RPP1 = 29 mL RPP2 = 29 mL	DPP = 0.36 mL RPP1 = 2.9 mL RPP2 = 2.9 mL	1220 (approx)

System solutions

Solution	Dilution by system	Volume dispensed per WUD cycle	Volume of undiluted solution used per WUD cycle	Total volume used for Wash2 undiluted
Cuvette Wash	1:10 with water	600 µL	60 µL	44 ml
Cuvette Conditioner	1:40 with water	600 µL	15 µL	11 ml

NOTE
The total volume of cuvette wash and cuvette conditioner used by the system can vary slightly from the volumes provided in the tables above. This is normal behavior.

Cleaning and replenishing the dilution bottle

Materials required:

- Deionized Water
- Physiological saline (0.9% NaCl)

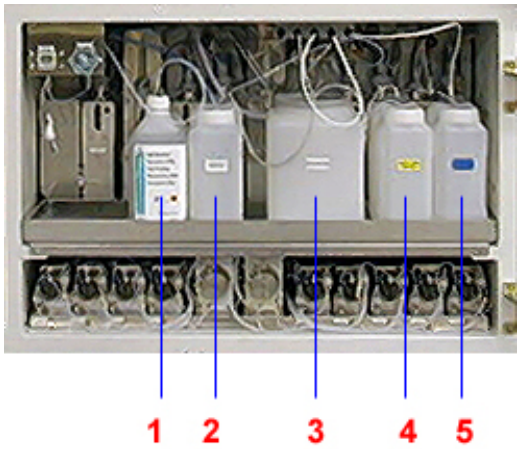
Time: 10 minutes

Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

NOTE
The dilution bottle may be cleaned when it is refilled, but must be cleaned at least once a month.



1 ISE buffer bottle
2 RRV (Reaction) bath oil
3 Isotonic saline diluent bottle
4 Cuvette detergent bottle
5 Cell conditioner bottle

Figure 5-17. Isotonic Saline diluent bottle

1. Lift the cover from the saline diluent bottle (**3**), and remove the bottle.

CAUTION
Note the bottle position on the shelf, to avoid mixing up the fluid bottles.

2. Empty the remaining contents of the bottle.
3. Rinse the bottle with deionized water and drain well.
4. Refill the bottle with 0.9% saline diluent.
5. Replace the bottle in the same position on the shelf in the cabinet.
6. Replace the cover of the diluent bottle.

   NOTE
   Make sure that the Teflon tube and filter holder are located at the bottom of the dilution bottle.

7. Prime the fluid lines:

   NOTE
   If you are cleaning the detergent or cell conditioner bottles at this time, you can prime all the fluid lines at once.

   a. At the Operation Panel, select **Prime**.
   b. At the PRIME Settings dialog box, select **Prime 2**, then type **10** or more in each of the number of times fields.
   c. Select **Execute**.

Cleaning and replenishing the cuvette wash bottle

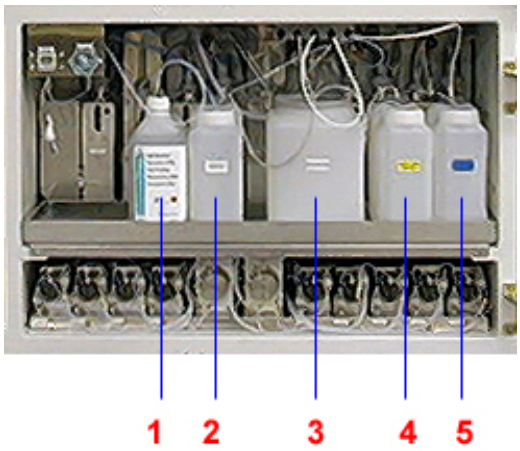
Materials required:

- Deionized water
- Cuvette detergent (wash solution)

Time: 10 minutes

Analyzer mode: READY

BIOHAZARD
Wear personal protective equipment.
Use universal precautions.



1 ISE buffer bottle
2 RRV (Reaction) bath oil
3 Isotonic saline diluent bottle
4 Cuvette detergent bottle
5 Cell conditioner bottle

Figure 5-18. Cuvette wash bottle

NOTE
The cuvette wash bottle may be cleaned when it is refilled, but must be cleaned at least once a month.

1. Unscrew the filter cap at the front top of the cuvette wash bottle (**4**), then pull up the tube with the filter.
2. Disconnect the cuvette wash bottle level sensor connector, then turn it counter-clockwise and pull it out.
3. Remove the bottle.

CAUTION
Make a note of the bottle position on the shelf, to avoid mixing up the fluid bottles.

4. Empty the remaining contents of the bottle.
5. Rinse the bottle with deionized water and drain well.

CAUTION
Ensure that the level sensor connector does not get wet, to avoid damaging it.

6. Refill the bottle with cuvette wash solution.
7. Return the bottle to the same position on the shelf in the cabinet.
8. Connect the cuvette wash bottle level sensor connector, then push the connector in and turn it clockwise.
9. Insert the filter and hose, then fasten the cap.

   NOTE
   Make sure that the filter holder is located at the bottom of the bottle.

10. Prime the fluid lines:

    NOTE

If you are cleaning other bottles, wait to perform this step for all fluid lines.

a. At the Operation Panel, select the **Prime** button.

b. At the PRIME Settings dialog box, select **Prime 2** and then type **10** or more for the number of times in all fields.

c. Select **Execute**.

Cleaning the chiller filter

Materials required:

- Vacuum cleaner

Time: 10 minutes
Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

NOTE
Access the chiller filter (located on the right inside bottom shelf of the analyzer cabinet) through the panel door on the right side of the analyzer.

1. On the right side of the analyzer, push and release the panel door to gain access to the chiller unit.
2. Locate the filter and slide it out of the analyzer.
3. Using a vacuum cleaner, remove the dust from the filter.
4. If the filter requires further cleaning, perform the following steps:
   a. Wash the filter under running water.
   b. Dry the filter before replacing it.
5. Slide the filter back in place and close the panel on the right side of the cabinet.

Every 2 months maintenance

Cleaning the dilution tray cuvettes

Materials required:

- 2-liter beaker
- Probe Wash 3 solution (REF 03164495, PN B01-4183-01)
- Deionized water

Time: 15 minutes (replacement)
10 hours (immersion)
Analyzer mode: Off

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

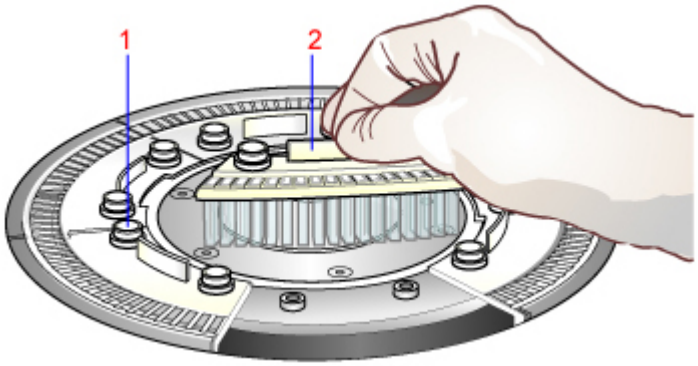


Figure 5-19. Components of dilution tray cuvette

1. Prepare 1.5 liters of 5% Probe Wash 3 solution diluted with deionized water.
2. Remove the 6 cuvette segments on the dilution tray (DTT).
   a. Unfasten the 2 thumbscrews (**1**) on each section.
   b. Grasp the cuvette section by the tab (**2**) and lift it from the tray.
   c. To remove the cuvettes under the dilution washer (DWUD) and splash cover, turn the tray by hand until the cuvettes are clear.
3. Immerse the cuvette segments in 5% Probe Wash 3 solution.
   a. Ensure no air bubbles are in the cuvettes.
   b. Allow the cuvettes to soak for at least 10 hours.
4. Wash the cuvettes under running water, then rinse them in deionized water.
5. Drain the water from the cuvettes.
6. Install the cuvette segments on the dilution tray (DTT) and fasten the thumbscrews by hand.
7. At the Operation Panel, select **Initialize**.

NOTE

Verify that the Operating mode field displays READY before performing any further actions.

8. At the Operation Panel, select **WASH**.
9. Perform the daily shutdown wash routine, then verify the operation.

Cleaning and replenishing the cuvette conditioner bottle

Materials required:

- Deionized water
- Cuvette conditioner

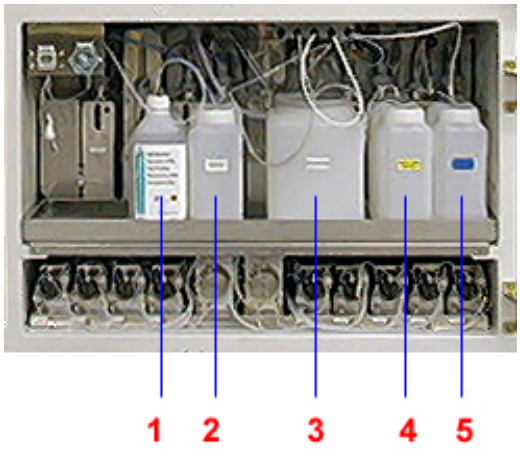
Time: 10 minutes
Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

NOTE

The cuvette conditioner bottle may be cleaned when it is refilled, but must be cleaned at least once every 2 months.



1 ISE buffer bottle
2 RRV (Reaction) bath oil
3 Isotonic saline diluent bottle
4 Cuvette detergent bottle
5 Cell conditioner bottle

Figure 5-20. Cuvette conditioner bottle

1. Open the filter cap at the front of the cuvette conditioner bottle (**5**), and pull up the tube with the filter.
2. Disconnect the cuvette conditioner bottle level sensor connector.
3. Turn the connector counter-clockwise and pull it out.
4. Remove the bottle.

CAUTION

Make a note of the bottle position on the shelf, to avoid mixing up the fluid bottles.

5. Empty any remaining contents of the bottle.
6. Rinse the bottle with deionized water and drain well.

CAUTION

Ensure that the level-sensor connector does not get wet to avoid damaging it.

7. Refill the bottle with cuvette conditioner.
8. Return the bottle to the same position on the shelf in the cabinet.
9. Connect the cuvette-conditioner bottle level sensor connector, then push the connector in and turn clockwise.
10. Insert the filter and hose, then fasten the cap.

    NOTE

    Make sure that the filter holder is located at the bottom of the bottle.

11. Prime the fluid lines:

    NOTE

    If you are cleaning other bottles, wait to perform this step for all fluid lines.

    a. At the Operation Panel, select **Prime**.

    b. At the Prime Settings dialog box, select **Prime 2** and type **10** for the Number of times in all fields.

    c. Select **Execute**.

Every 3 months maintenance

Replacing the lamp

Materials required:

- Halogen lamp, 12 V/50 W
  (REF 02127928, PN 073-0099-01)

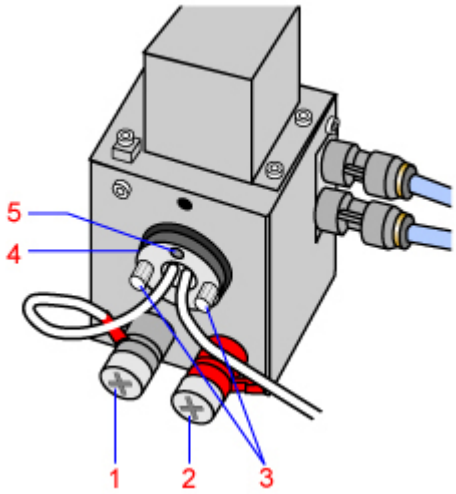
Time: 60 minutes
Analyzer mode: OFF

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

You must replace the lamp under the following conditions:

- quarterly
- after approximately 2000 hours of use
- if the system warns that lamp energy is out of range
- if the weekly Checking Lamp Energy procedure indicates the A-D points are outside the ±40 range of the scatter plot center line
- if the ATTENU(%) for any of the 14 wavelengths on the Lamp Check Energy window falls below 80%



1 Lead Wire Connector
2 Lead Wire Connector
3 Lamp Screws
4 Lamp Plate
5 Alignment Hole and Pin

Figure 5-21. Components of the lamp

1. Put the system in Standby mode.
2. Lift and remove the access panel in front of the Rotating Reaction Tray to expose the lamp housing.

WARNING

The lamp housing is **hot**. Allow it to cool down (approximately 10 minutes) before touching any components, to avoid burns.

3. Loosen the lead wire connectors (**1** and **2**), then remove the wires.

4. Unfasten the lamp screws (**3**) on the plate (**4**) and remove the halogen lamp from the housing.

CAUTION

Be careful not to drop the screws.

5. When installing the new lamp, align the hole to the locating pin (**5**).

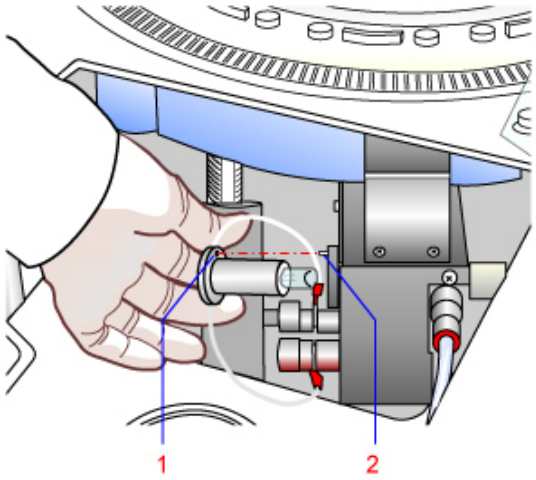


Figure 5-22. Locating pin

CAUTION

Do not touch the glass portion of the lamp, to avoid damaging it. If the lamp is dirty, clean it using lint-free toweling moistened with 5% bleach solution.

6. Install the lamp screws.
7. Install the lead wires and fasten the knobs.
8. Replace the access panel.
9. Return the system to Operating mode.
10. Wait 40 minutes for the lamp to stabilize.
11. Check the lamp energy (see the *Weekly Maintenance* section).
12. Perform the cell blank measurement test.

    NOTE

    Siemens recommends the assays on the system be calibrated after the lamp is replaced.

13. Run controls to verify that all assays are within the laboratory's established control ranges.

Washing the ISE electrodes lines

Materials required:

- Dummy electrode with o-ring and cap (REF 05938765, PN 073-0342-01)
- ISE detergent solution (REF 01307361, B01-4174-01)

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Time: 25 minutes
Analyzer mode: Manual operation

1. At the Menu Panel, select **Maint.**, then select **ISE Operation**.
2. Remove the Na, K, Cl, and Ref electrodes and install the dummy electrode.
3. Install the dummy electrode (**2**) in place of the 4 electrodes removed in step 2.
4. Secure the dummy electrode in place by positioning the retaining bracket (**3**) over the electrode, then tightening the thumbscrew (**4**).

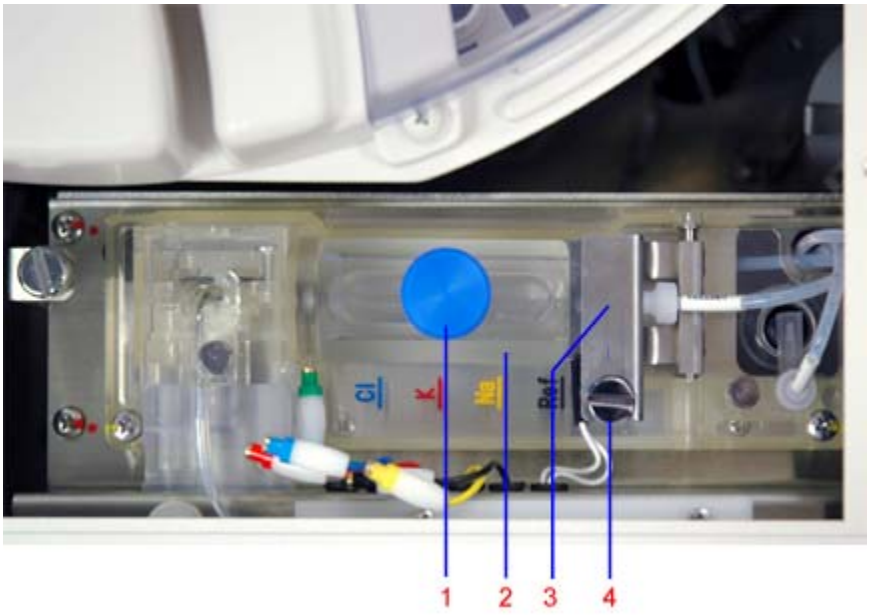


Figure 5-23 Replacing the electrodes with a dummy electrode

WARNING

ISE detergent is a sodium hypochlorite solution. When handling bleach, wear protective clothing, gloves, and safety glasses. It is harmful if swallowed and may cause eye or skin irritation. In case of skin or eye contact, flush with large amounts of water.

5. Remove the cap (**1**) from the dummy electrode and pour approximately 5 mL of ISE detergent solution into the dummy electrode.

CAUTION

Be sure to tighten the cap on the dummy electrode. If the cap is loose or defective, the ISE detergent solution may leak into the module and cause damage.

6. Replace and tighten the cap.
7. At the ISE Operation window, select **Execute (STEP-1)**.

   The message "Line Wash 1 Running" and the approximate amount of time remaining displays. You cannot stop this operation. If you must stop, press the **SYSTEM STOP** button on the analyzer display panel.

   This step takes about 17 minutes.

8. When step 1 of the wash completes, replace the dummy electrode with the original Na, K, Cl, and Ref electrodes.
9. At the ISE Operation window, in the ISE line wash area, select **Execute (STEP-2)**

   The wash starts and buffer prime is performed 10 times. The message "Line Wash 2 Running" and the approximate amount of time remaining displays.

10. Verify no leaks or bubbles exist and that the buffer is going to the waste during the priming cycle.
11. At the ISE Operation window, next to the Initialize button, select **Execute**.
12. Perform calibration and run controls.

Every 4 months maintenance

Cleaning the ancillary reagent bottle filters

Materials required:

- Filters (REF 08602474, PN 073-0033-01) order one set per bottle

Time: 20 minutes
Analyzer mode: OFF

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

Use this procedure to clean the filters in the following bottles

- RRV (reaction) bath oil
- Diluent
- Cuvette wash
- Conditioner

1. Open the filter cap at the front of each bottle and pull up the filter line.
2. Unfasten the connector at the end of the line.

   NOTE

   If any of the filters are ripped or damaged, replace them with new filters.
3. Remove the filter and inspect it for particles or dirt.
4. If dirty, clean the filters:
   a. Place the filters in a beaker filled with a fresh 10% solution of water and household bleach.
   b. After 30 minutes, remove the filters.
   c. Rinse them in deionized water.
   d. Replace them into their respective holders.
5. Fasten the connector.
6. Using a pad soaked in 5% bleach solution, clean the outside surfaces of the filter holders and hoses.
7. Insert the filter hoses into the bottles, then fasten the caps.
8. At the Operation Panel, select **Prime**.
9. At the Prime Set dialog box, select **Prime 2.**
10. Type **10** or more for the number of times in all fields, then select **Execute**.

Cleaning the pure-water bottle filter

Materials required:

- Ten 10R filters (REF 01160530, PN 073-0035-01)
- One 18R filter (REF 01448895, PN 073-0034-01)
- Hex wrench

Time: 15 minutes
Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Clogged filters create an insufficient flow rate and produce air bubbles.

NOTE

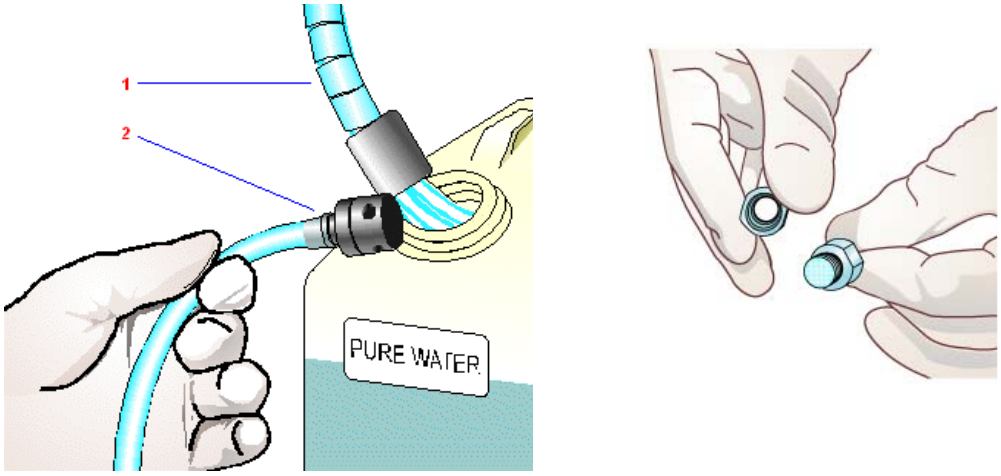
A set of filters is included in the supplies kit. To avoid system down-time, replace the filter with the one in the kit, resume operation, and then clean and store the removed filter for the next scheduled maintenance.

1 Pure-water bottle

Figure 5-24. Pure-water bottle

1. Ensure that the instrument is in READY mode.
2. Remove the silicon return hose (**1**) from the top front of the pure water bottle.

   The filter is contained in a metal filter holder attached to the end of the return hose.



1 Silicon Return Line
2 Metal Filter Holder

Figure 5-25. Pure-water bottle lines and filter

3. Using pliers if necessary, unfasten the filter holder from the end of the return hose and remove the filter.

NOTE

If the filter is ripped or damaged, replace it with a new filter (18R).

WARNING

Household bleach is 5% or 6% sodium hypochlorite. When handling bleach, which can be used as a cleaning and antiviral agent, wear protective clothing, gloves, and safety glasses. It is harmful if swallowed and may cause eye or skin irritation.

4. To clean the 18R filter:
   a. Place the filter in a beaker filled with a freshly made 10% solution of household bleach and water.
   b. After 30 minutes, remove the filter and rinse it with deionized water and replace onto the filters.
5. Remove the ten small 10R Teflon filter hoses from the top front of the water bottle.

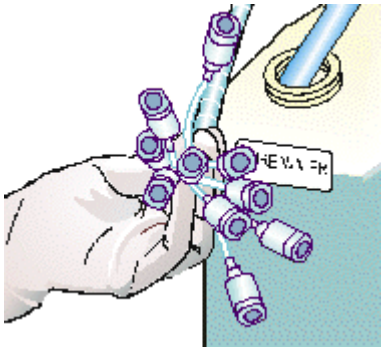


Figure 5-26. 10R filters

CAUTION

To assist with removal as well as to avoid crimping these thin filter hoses, remove only 3 or 4 hoses from the water bottle at a time.

6. First unfasten the filter holder from the end of each tube, and then remove the filter.
7. To clean the 10R filter:
   a. Place the filter in a beaker filled with a freshly made 10% solution of household bleach and water.
   b. After 30 minutes, remove the filter and rinse it with deionized water and replace onto the filters.

CAUTION

Ensure that the filters are properly positioned with the filter holder to avoid filter shift.

8. Using a lint-free towel soaked in 5% bleach solution, clean the outside surfaces of the filter holder and hose.
9. Insert the silicon filter hose into the water bottle.
10. Insert the ten Teflon filter hoses in the tank, 3 or 4 at a time.
11. Prime the lines:
    a. At the Operation Panel, select the **Prime** button.
    b. In the PRIME Set dialog box, select **PRIME 2** and type **10** or more for the number of times in all fields.
    c. Select **Execute**.

Replacing the reaction and dilution cuvettes

Materials required:

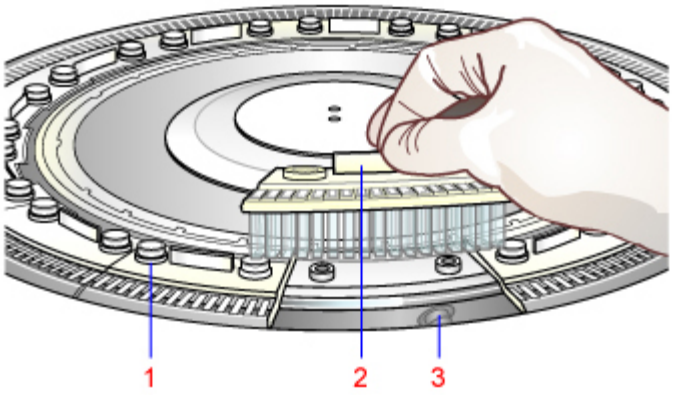
- 13 sets of reaction cuvettes (sample cell RRV, single cuvette set, REF 05024992, PN 073-0023-02)
- 6 sets of dilution cuvettes (sample cell DTT, single cuvette set, REF 05049669, PN 073-0022-01)

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Time: 20 minutes
Analyzer mode: OFF

Replace the 20 sets of reaction (RRV) cuvettes and 6 sets of dilution (DTT) cuvettes once every four months.



1 Thumbscrew
2 Tab
3 Detector Unit

Figure 5-27. Reaction and dilution cuvette components

1. Put the system in Standby Mode.

WARNING

Failure to put the analyzer into Standby mode will result in the RRV bath oil over-filling. Excess RRV bath oil can damage the spectrophotometer when the RRV cuvettes are reinstalled.

Turn off the power before removing or replacing cuvettes, to allow the RRV to move freely.

2. Remove the 13 cuvette sets on the reaction tray (RRV).
   a. Unfasten the 2 thumbscrews (**1**) on each set.

CAUTION

Be careful not to get RRV bath oil inside the cuvette. If you do, allow the cuvette to dry overnight.

CAUTION

Be careful not to drop the cuvette set screws into other components of the instrument. **Do not** remove the cuvette if it is in front of the detector (**3**).

   b. Hold the cuvette set by the tab (**2**) and lift it from the tray.
   c. To remove the cuvette sets located by the detector unit or under the cuvette wash station (WUD), rotate the reaction tray by hand until the cuvettes are in an accessible location.
3. Inspect the reaction bath oil in the RRV bath ring.
   - If particulate matter is found, remove it with a transfer pipette or other similar device.
   - If the contamination is more drastic, such as a WUD overflow causing large quantities of liquid to float on the oil, then discontinue this procedure and call your local technical support provider or distributor.
4. Install the new cuvette sets on the RRV and fasten the set screws.

CAUTION

Do not touch or scratch the cuvette surfaces or wipe the cuvette interior, to avoid damaging the cuvettes.

5. Remove the 6 cuvette sets on the dilution tray (DTT).
    a. Unfasten the 2 thumbscrews (**1**) on each section.
    b. Hold the cuvette section by the tab (**2**) and lift it from the tray.
    c. To remove the cuvettes under the dilution washer (DWUD) or cuvette splash cover, rotate the dilution tray by hand until the cuvettes are clear.
6. Install the new cuvette sets on the DTT and fasten the set screws by hand.
7. Return the system to Operating mode.
8. Perform the daily Shutdown wash (WASH2) routine and verify the operation.
9. Perform the lamp energy check procedure.
10. Perform the cell blank measurement, and if the cell blank run was completed successfully, save the results.

As required maintenance

Backing up system files

The system software consists of the operating system, data processing software, and user-specific system and data files. Back up the system files to a USB Memory Stick or a formatted CD / CD-RW / DVD disc whenever you make any configuration or parameter changes. The Restoring System Files procedure follows this procedure.

Materials required:

USB memory stick or CD-RW disc or DVD-RW disc

Time: 10 minutes
Analyzer mode: READY

1. Use an indelible marker to write **System back up** with the current date on a disc label.
2. If the disc is not formatted, format the disk as follows:
   a. Place a blank CDRW or a blank DVDRW into the CD/DVD drive.
   b. Select the **Drag-to-Disc** icon located to the left of the time display in the lower right corner of the window.
   c. On the Drag-to-Disc popup window, right-select the disc.
   d. Select **Format disc**.
   e. Select **Full format**.
   f. Select **OK**.
   g. When prompted, select **Yes**.
3. At the Startup window, select **Back-up**.
4. At the ADVIA Backup window, select **Make a Backup Copy**.
5. Select the Target Files to be backed up from the following options:
   - **System Files** - Approximately 30 MB of disk space is required.
   - **Data Files** - Disk space required is dependent on the amount of data stored on the C:/ drive. A new CD holds approximately 650 MB.
6. Verify that the backup name is the current date.

   NOTE

   The system names the backup automatically, which consists of a yyyymmdd format. Accept the destination folder default for the DVD disk drive letter (usually D:) or select **Browse** to choose a different destination. If a recordable disk is not available, then the backup can be stored on the partitioned storage drive (D:).
7. Select **Execute**.
8. At the Backup window, select **OK** to confirm the copy.

   NOTE

   If an error window displays, reformat the disk and try again.
9. When the file copy completes, at the Backup window, select **OK**.

Restoring system files

1. Insert the CD or the DVD containing the backup files into the CD drive.

   NOTES

   - When restoring backed-up data files (in the Data subfolder under the A002 folder), select the **Delete Data Files** checkbox at the ADVIA Backup window. This deletes any current data files on the PC hard drive before the backed up system and data files are restored.
   - If the current data files are needed, perform a backup before restoring previous files. The restore feature restores all files (system and/or data files) that were previously backed up. If this is the case, close the ADVIA Backup window and perform Backing up system files (see above).

2. At the Startup window, select **Back-up**.
3. At the ADVIA Backup window, select **Restore a Backup Copy**, then browse to the source folder that contains the backup files to restore and select **Execute**.
4. At the Restore confirmation window, select **OK**.

   If the disk contains all the backed up files required for the restore procedure, the copy function begins.

5. If the backed up files are on more than one disk, select **Continue**.
6. At the ADVIA Backup window, select **Exit**, select **Restore**, then select **OK**.
7. At the ADVIA Backup window, select **Cancel**.
8. Reboot the PC.

Replacing the SPP, RPP1, and RPP2 probes

Materials required:

- Probes:

  DPP (without crash detection),
  REF 003975051, PN 073-0223-01

  DPP (with crash detection),

  REF 02030495, PN 073-0611-01

  SPP-(REF 03975051, PN 073-0223-01)

  RPP1,2-(REF 0551684, PN 073-0224-01)
- Phillips screwdriver
- Pliers
- Lint-free towels

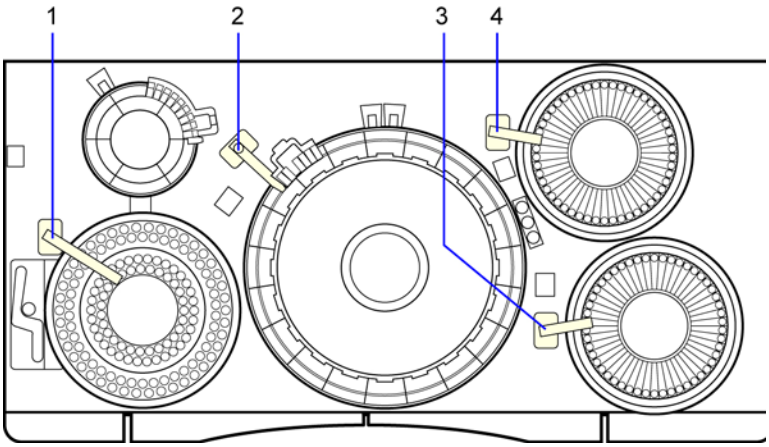
Time: 10 minutes
Analyzer mode: STANDBY

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

NOTE

Use this procedure to replace SPP and RPP probes **not** equipped with crash detection. For dilution probes (DPP) equipped with crash detection, refer to *Replacing DPP probes - with crash detection*.



1 Dilution Probe (DPP)
2 Sample Probe (SPP)
3 Reagent Probe 1 (RPP1)
4 Reagent Probe 2 (RPP2)

Figure 5-28. Probes

Remove the probe

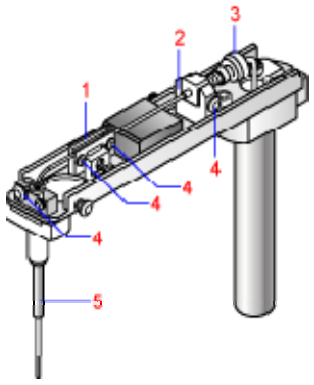
1. Put the system in Standby mode.

   CAUTION
   To keep from damaging the probe tip when the power is off, you must manually support the probe and be careful not to strike it against anything on the analyzer.

2. Cover the cuvettes, wash cups, and other analyzer surfaces with lint-free towels to catch any screws that might fall.
3. Lift and manually rotate the probe to an accessible location.

Probe	Accessible Location
Sample probe (SPP)	Over the dilution tray (DTT)
Reagent probe 1 (RPP1)	Over reagent tray 1 (RTT1)
Reagent probe 2 (RPP2)	Over reagent tray 2 (RTT2)

4. Loosen but do not remove the setscrews on each side of the probe cover. Lift the cover off the probe.
5. Using pliers or your fingers, loosen the knurled fitting (**3**) counterclockwise, then unfasten and remove it by hand.
6. Loosen but do not remove setscrews (**4**).
7. Lift the old probe and discard.



1 Terminal 2
2 Joint Holder
3 Joint Connector
4 Philips Screws (4 places)
5 Probe Tube

Figure 5-29. Probe without cover

Install a new probe

1. Slowly insert the new probe (**5)** through the guide hole (**7**) until the flange (**8**) is seated against terminal 1 (**6**).
2. Verify that the probe is correctly positioned in terminal 2 (**1**) and the joint holder (**2**).
3. Tighten the setscrews while maintaining the probe position in terminal 2 and the joint holder.
4. Finger-tighten the joint connector.

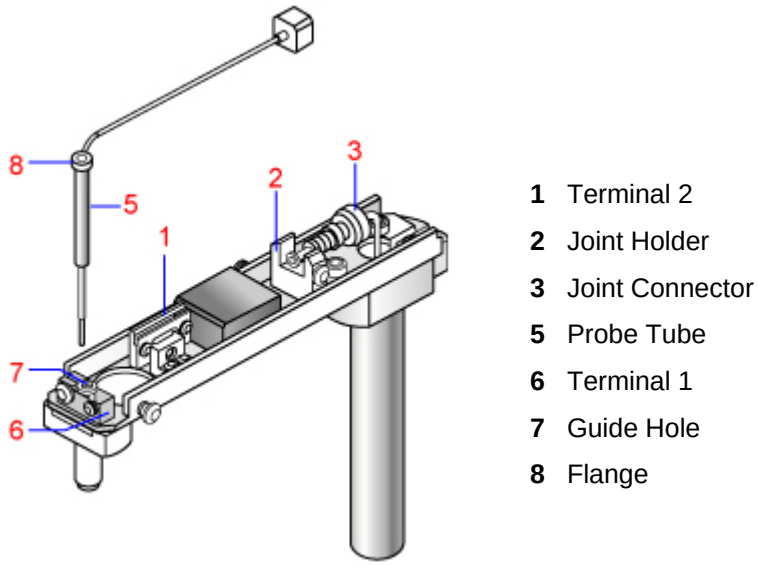


Figure 5-30. Installing new probe

CAUTION

To avoid damaging the threads or introducing leaks or air bubbles, do not cross thread or force the knurled fitting in too far.

5. Replace the probe-arm cover and tighten the two probe cover screws.
6. Lift up the probe arm to the end of its travel. Manually rotate the probe over the probe wash cup but not within the wash port.
7. Put the system in Operating mode.
8. At the Menu Panel, select **Maint.**, then select **User maint.** In the Probe posi.adjust area, select **Position adjust start**.

   All probes (DPP, SPP, RPP1, and RPP2) move over cuvettes.

9. Ensure that the probe is perpendicular to the arm and centered over the cuvette. If not, call your local technical support provider or distributor.
10. At the Operation Panel, select **Initialize** to return the probes back to home (over the wash cups).

11. At the Operation Panel, select **PRIME**, then select **PRIME 2,** then **Execute** to ensure proper water flow through the probe.

NOTE

Make sure that no water is leaking from the knurled fitting.

Replacing DPP probes equipped with crash detection

Materials required:

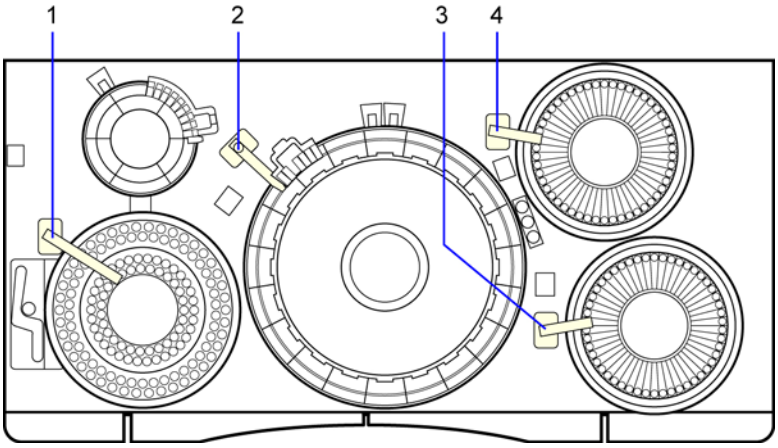
- Probes:

  DPP-equipped for crash detection (REF 02030495, PN 073-0611-01)
- Phillips screwdriver
- Pliers
- Lint-free towels

Time: 10 minutes
Analyzer mode: STANDBY

BIOHAZARD

Wear personal protective equipment. Use universal precautions.



1 Dilution Probe (DPP)
2 Sample Probe (SPP)
3 Reagent Probe 1 (RPP1)
4 Reagent Probe 2 (RPP2)

Figure 5-31. Dilution probe location

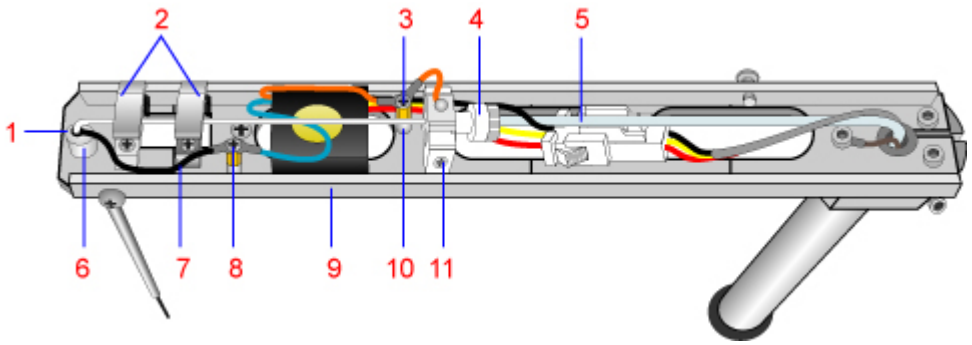
Removing the DPP probe

1. Put the system in Standby mode.

CAUTION

Manually support the probe and be careful not to strike it against anything on the analyzer, to avoid damaging the probe tip when the power is off.

2. Cover the cuvettes, wash cups, and other analyzer surfaces with lint-free towels to catch any screws that may fall.
3. Lift and manually rotate the probe over the sample tray, either over the sample tray or over the ISE.
4. Loosen but do not remove the screws on each side of the probe cover.
5. Lift the cover off the probe arm.



1	Probe	**7**	Black Wire
2	Spring Clips	**8**	Wire Lock Screw
3	Probe Wire Screw	**9**	Probe Arm
4	Joint Connector	**10**	Probe Wire Post
5	Probe Tubing	**11**	Joint Holder (and Locking Screw)
6	Probe Guide		

Figure 5-32. DPP probe without cover

6. Using pliers, if necessary, gently loosen the probe joint connector (**4**), then slide it back on the tubing (**5**) approximately 1 cm.
7. Gently flex and pull back on the tubing (**5**) to remove it from the end of the probe body.

CAUTION

Be careful not to damage the flare end or kink the tube.

8. Loosen but do not remove the locking screw (**11**).
9. Loosen but do not remove the probe wire screw (**3**), then remove the orange probe wire from the post (**10**).

CAUTION

Do **not** force the wire or bend excessively, to avoid breaking the wire off of the probe body mount.

10. Securely hold the probe arm (**9**) and open the 2 spring clips (**2**) by grasping each at the side closest to the black wire (**7**) going to the probe (**1**) and gently raising each to an open, locked position.

CAUTION

There is some spring resistance when attempting to open the clips. Do not allow the probe arm to swing side to side when opening the clips.

11. Loosen but do not remove the wire lock screw (**8**).
12. Remove the black wire (**7**) from the post coming from the probe (**1**), but leave the other blue wire attached.
13. Gently lift the probe (**1**) up through the probe guide (**6**), then carefully remove it from the probe arm (**9**).

14. Discard the old probe.

Install the new probe

1. Carefully insert the new probe (**1**) into the probe guide (**6**).
2. Lower the probe fully into the guide so that the rear tube fitting rests in the joint holder (**11**).
3. While holding down the rear tube fitting, tighten the locking screw at the joint holder (**11**).
4. Carefully close each spring clip (**2**) over the probe.

CAUTION

Do **not** allow the clips to snap on the probe shaft, to avoid damaging the probe.

5. Reconnect the black wire (**7**) under the wire lock screw (**8**) and tighten the screw.

   To prevent damaging the wire, avoid flexing the wire more than necessary.

CAUTION

If the screw does not fully tighten, or the standoff spins, tighten the screw on the probe arm base until the standoff no longer spins; otherwise the liquid-level-sensing capability may be adversely affected.

6. Reconnect the orange probe and preamp wires to the post (**10**).
7. Carefully flex the tubing (**5**) and slip the flared end into the probe joint holder (**11**).
8. Slide the knurled nut of the joint connector (**4**) into the joint holder (**11**) and carefully tighten until snug.

CAUTION

Do not cross thread or force the joint connector in too far, to avoid damaging the threads or introducing leaks or air bubbles.

9. Replace the probe arm cover and tighten the 2 probe cover screws.
10. Lift up the probe arm (9) to the end of its travel, then manually lift and rotate the probe over the probe wash cup but not within the wash port.
11. Put the system in Operating mode.

Priming the system

1. At the Menu Panel, select **Maint.**, then select **User maint**. (For additional details, refer to Using the User Maintenance window.).
2. At the User Maintenance window, in the Position Probes for Routine Cleaning area, select **Start**, then select **Yes** when prompted.
3. Ensure that the probe is perpendicular to the arm and centered over the cuvette.

4. If not centered, call your local technical support provider or distributor.
5. At the Operation Panel, select **Initialize** to return the probes back to home (over the wash cups).
6. At the Operation Panel, select **Prime**, **PRIME 2**, and then **Execute** to ensure proper water flow through the probe.

NOTE

Make sure that no water is leaking from the joint connector (4).

Replenishing the RRV (reaction) bath oil bottle

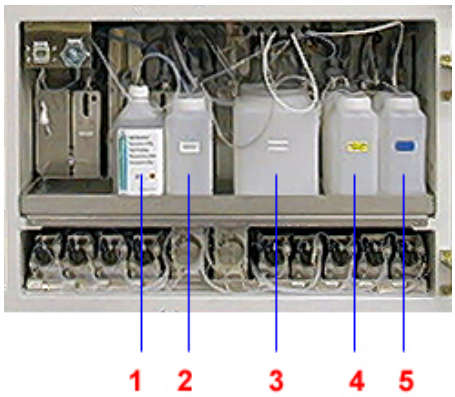
Materials required:

- RRV (reaction) bath oil (REF 09323099, PN B01-4180-01)

Time: 10 minutes
Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment. Use universal precautions.



1 ISE buffer bottle
2 RRV (Reaction) bath oil bottle
3 Isotonic saline diluent bottle
4 Cuvette detergent bottle
5 Cell conditioner bottle

Figure 5-33. RRV bath oil bottle

CAUTION

Do not attempt to clean the RRV bath oil bottle (**1**) with water; RRV bath oil and water do not mix.

1. Unscrew the filter cap (**3**) at the front of the RRV bath oil bottle (**1**), then pull up the tube with the filter.
2. Disconnect the RRV bath oil bottle level sensor connector (**2**), then turn the connector counter-clockwise and pull it out.

CAUTION

Make a note of the bottle position on the shelf, to avoid mixing up the fluid bottles.

3. Remove the RRV bath oil bottle (**1**).

CAUTION

Ensure that level-sensor connector (**2**) does not get wet, to avoid damaging it.

4. Refill the bottle with RRV (reaction) bath oil.
5. Replace the bottle on the shelf in the cabinet.
6. Connect the RRV bath oil bottle level sensor connector (**2**) by pushing the connector in and turning it clockwise.
7. Insert the filter and tube, then fasten the cap.

   NOTE

   Make sure that the filter holder is located at the bottom of the bottle.

Preventive cleaning of the wash station lines

Materials required:

- 5 reagent containers, empty, 70-mL (optional)
- Probe Wash 1
- Probe Wash 2
- 10% Cuvette Wash solution
- 5% Probe Wash 3 solution
- 70-mL reagent container (REF 06397121, PN 073-0373-02)
- Wash solution labels (REF 00153468, PN 073-0406-02)
- Deionized water

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Time: 45 minutes
Analyzer mode: READY

If you experience a problem with clogs in the wash station aspiration nozzles and lines, use this procedure to clean the WUD and DWUD wash station aspiration nozzles and lines.

1. Prepare either of the following wash solutions:

WARNING

Probe Wash 3 contains 4.5% potassium hydroxide and 2% sodium hypochlorite. Avoid contact with skin and eyes. Probe Wash 3 is a corrosive material that can cause burns. Wear suitable protective clothing, gloves and eye/face protection. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Household bleach is 5% sodium hypochlorite. When handling bleach, which can be used as a cleaning and antiviral agent, wear protective clothing, gloves, and safety glasses. It is harmful if swallowed and may cause eye or skin irritation.

Use household bleach that is free of heavy metals, such as Clorox.

- **Preferred Solution** – Prepare a 10% solution of Probe Wash 3 by diluting 1 part of Probe Wash 3 with 9 parts of distilled or deionized water. The minimum recommended volume is 100 mL Probe Wash 3 plus 900 mL of distilled or deionized water.
- **Alternate Solution** – Prepare a 20% solution of household bleach by diluting 1 part of bleach with 4 parts of distilled or deionized water. The prepared solution is

stable for one week when stored at room temperature. Minimum recommended volume is 200 mL bleach plus 800 mL of deionized distilled water.

NOTE
The remainder of this procedure describes the steps to clean the WUD and DWUD wash stations. Perform the entire procedure for the WUD lines and nozzles, then repeat the entire procedure for the DWUD lines and nozzles. The various parts are described as the "DWUD/WUD," meaning one or the other, depending on which is being cleaned at the time, and does not mean both simultaneously.

2. Prepare the WUD/DWUD for cleaning:
   a. With the system in READY mode, log on as **supervisor**.
   b. Place paper towels on top of the RRV and DTT cuvettes directly under the WUD/DWUD nozzles as a precaution.
   c. Using a 4-mm hex wrench, loosen the captive screw (**1**) that secures the WUD/DWUD wash head to the WUD/DWUD mechanism.

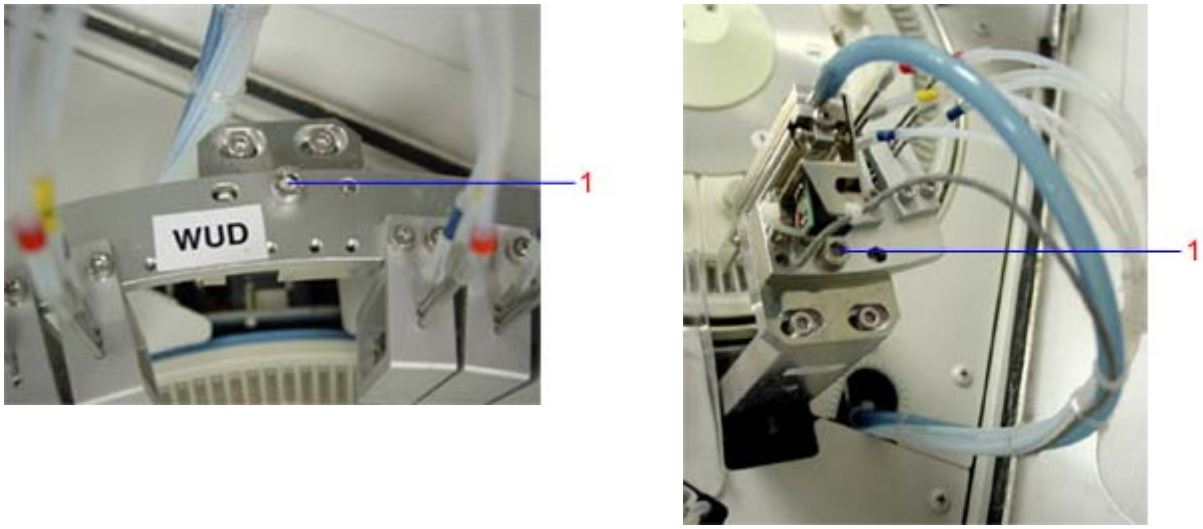


Figure 5-34. WUD and DWUD captive screw

   d. Lift up the WUD/DWUD wash head and place it in a shallow plastic tray on top of the paper towels.

      NOTE
      Use a shallow tray for washing the nozzles. A tray with a depth of 35 – 40 mm is most suitable. Trays with higher sides may require additional wash solution.

   e. Place the dryer nozzle outside the tray (**1**) and all the other nozzles inside the tray.

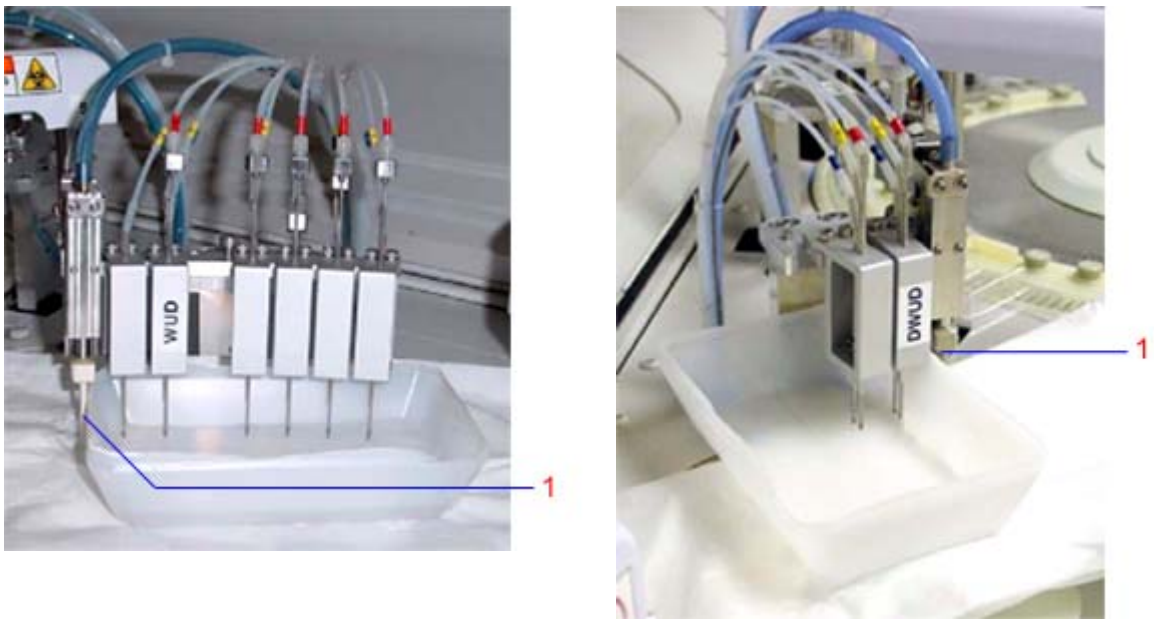


Figure 5-35. WUD and DWUD dryer nozzle

f. Fill the tray with deionized water, being careful not to overflow the tray.

g. Pour enough deionized water into the tray so that the center nozzles (yellow-labeled overflow nozzle) are in liquid.

3. At the Menu Panel, select **Maint.**, then select **JEOL Maintenance**.

   NOTE

   If the JEOL Maintenance option is not listed on the Maint. menu, call your local support provider for access to this menu option.

4. At the JEOL Maintenance window, in the Univers. sequence start area, type **1** in the Sequence field and **1** in the Number of times field, then select **Start**.

5. Select **Yes** at the confirmation window to start the procedure.
   - UNIVERSAL displays as the operation mode.
   - One sequence takes about 65 – 70 seconds.
   - This sequence activates the appropriate devices so all the WUD/DWUD aspiration nozzles and overflow nozzles are pulling vacuum.
   - The overflow lines (short nozzles) aspirate air after a short while as the liquid in the container lowers. Add more liquid as necessary to flush out the overflow lines.

6. When the operation mode returns to READY, lift the WUD/DWUD wash head out of the tray and temporally place it on top of the WUD/DWUD assembly.

7. Remove and empty the tray, then place it back on paper toweling under the WUD/DWUD nozzles.

8. Place the WUD/DWUD wash head into the tray and fill the tray with 10% Probe Wash 3 solution (preferred) or 20% bleach solution (alternate).

9. Pour enough wash solution into the tray, so the center nozzle (yellow-labeled overflow nozzle) is in liquid, without overflowing the tray.
10. Repeat steps 4 and 5, to clean the WUD/DWUD lines with the 10% Probe Wash 3 or 20% bleach solution.
11. Repeat steps 4 and 5 until the lines are cleaned thoroughly.

    NOTE

    As an aid to cleaning the aspiration lines, manually lift the WUD/DWUD wash head in and out of the cleaning solution to introduce air into the lines.
12. When the operation mode returns to READY, lift the WUD/DWUD wash head out of the tray and temporally place it on top of the WUD/DWUD assembly.
13. Using a lint-free cloth, carefully clean the stainless steel nozzles of the WUD/DWUD wash head.
14. Remove, empty, and rinse the tray to remove any residual cleaning solution, then place it back on paper toweling under the WUD/DWUD nozzles.
15. Place the WUD/DWUD wash head into the tray, then fill the tray with deionized water.
16. Repeat steps 4 and 5 to flush out the cleaning solution with deionized water.
17. Repeat this sequence twice as many times as the sequence was run with the cleaning solution, to ensure that no residual cleaning solution is left in the lines.

    NOTE

    A colored food dye may be added to the rinse water as a visual aid, to verify the blue and yellow aspiration lines are not clogged and are working properly.
18. When the operation mode returns to READY, move the WUD/DWUD wash head on top of the WUD/DWUD assembly and secure it by tightening the 4-mm captive hex screw.
19. Remove the tray and paper towels from the system.
20. Repeat this procedure from step 2 for the other wash head, if needed, and then proceed to step 21.
21. Exit the JEOL Maintenance window.
22. Run a Startup Wash (WASH3) procedure on the system, then verify proper hydraulic operation and mechanical alignment of the WUD/DWUD assemblies during the Startup Wash.
23. Run your laboratory’s quality control material and verify the results are within acceptable ranges.

Washing all the ISE lines

Materials required:

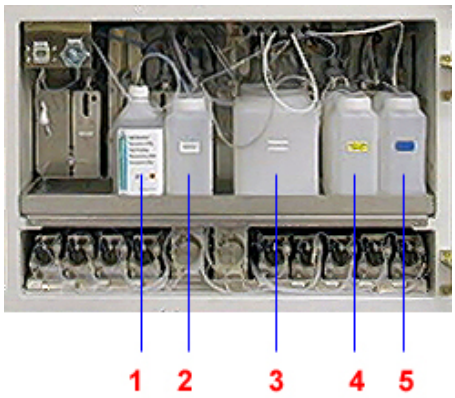
- 2 clean, empty buffer bottles
- Probe Wash 3 solution
- Dummy electrode
- Phillips head screwdriver

Time: 15 minutes
Analyzer mode: Manual operation

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

1. At the Menu Panel, select **Maint.**, then select **ISE Operation**.
2. In the Period.wash area, select **OFF**, then select **Set**.
3. Open the front doors and replace the buffer solution (**1**) with another buffer bottle containing 500 mL of deionized water.



1 ISE buffer bottle
2 RRV (Reaction) bath oil bottle
3 Isotonic saline diluent bottle
4 Cuvette detergent bottle
5 Cell conditioner bottle

Figurer 5-36. Location of ISE Buffer bottle

4. Loosen the thumb screw and lift the ISE cover.
5. Disconnect the electrode connectors.
6. Remove the thumbscrew (**1**) to release the plate that secures the electrodes and the block containing the electrode.

Figure 5-37. ISE electrode plate thumbscrew

7. Remove the electrodes and replace it with the dummy electrode.
8. At the ISE Operation window, in the Bufferprime area, type **50** in the Times field.

9. Select **Execute**
10. When prompted, select **Yes** to execute buffer prime.

Washing the lines

1. Remove the buffer bottle with the deionized water and replace it with a bottle filled with a solution of 475 mL of deionized water and 25 mL probe wash 3 solution.
2. At the ISE Operation window, in the Bufferprime area, enter **50** in the Times field.
3. Select **Execute**.
4. When prompted, select **Yes** to execute the buffer prime.

Rinsing the lines

1. Replace the probe wash 3 solution bottle with a bottle of deionized water.
2. In the Bufferprime area, enter **50** in the Times field, then select **Execute**.
3. Remove the dummy electrode.
4. Reinstall the Na, K, and Cl electrodes.
5. In the Initialize area, select **Execute**.
6. Before reinstalling the buffer-solution bottle, thoroughly rinse the buffer bottle cap, float switch, and tube with deionized water and dry completely.
7. Install the buffer bottle or replace it if the volume is low.

Priming and initializing the ISE module

1. At the ISE Operation window, in the Bufferprime area, enter **15** in the Times field.
2. To prime the line with buffer, select **Execute**, then select **Yes**.
3. When the priming is finished, verify that the electrodes are not leaking.
4. At the ISE Operation window, select **Exit**, then select **Yes**.
5. Run 10 pooled serum samples, or do an ISE CV check.
6. Perform calibration and run controls.

Conditioning the ISE Na and K electrodes

Materials required:

- 10 mL of serum pool
- 30 mL of ISE Buffer (REF 03463190, PN B01-4171-51)
- 2-mL or 3-mL plastic, disposable pipette

Time: 5 minutes (preparation)
24 hours (immersion)
Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

NOTES

- The Cl electrode does not require conditioning.
- If the slope of the electrode is in the range of 46 – 49 (Na or K) and the Daily Maintenance Log entries for the electrode shows it is trending down, then perform this procedure.
- If the slope is low and a trend is not observed, verify that all other ISE maintenance is current before performing this procedure.

1. Prepare a 1:4 dilution of pool serum using ISE buffer solution.
2. Remove the new electrode from its case.

   NOTE

   The ion electrode contains an inner solution, which can be confirmed by shaking the electrode. This solution decreases little by little with time. If you do not feel any response in your shaking, measure its weight. If the electrode weighs less than 9 g, do not use it.

3. Remove the sponge from the bottom of the electrode case and place the electrode to be conditioned back into the case.
4. Using a dropper or pipette, add 0.5 mL of pool serum into the flow path of the electrode.

   Be sure to apply the serum thoroughly.
5. Add buffer solution, prepared in step 1, to the case. Cover the entire electrode with the solution.

   Allow the electrode to condition overnight.
6. When conditioning is complete, remove the electrode, wash it with deionized water, and dry it thoroughly

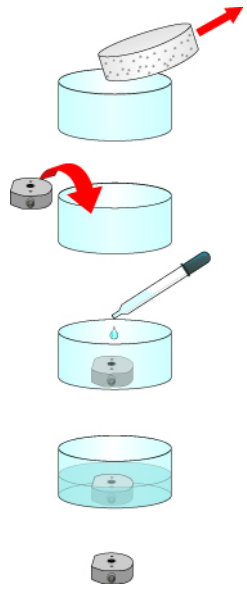


Figure 5-38. Soaking the electrode

WARNING

To prevent infection, by contacting serum directly, wear suitable protective gloves when you remove the electrode from the solution.

NOTE

High-concentrated salt water is used as a preservation solution to maintain electrode performance. When the electrode package is opened, wash the electrode with sufficient water and wipe well before use. Small amounts of salt on the electrode may cause rust on the electrode connector.

NOTE

Storing the reference electrode:

a. Remove the reference electrode from the ISE module.

b. Rinse the reference electrode with deionized water.

c. Place it into an appropriate container.

d. Cover the reference electrode with reference electrode filling solution.

e. Cover the container and store at -18 to 4.5 °C (0 to 40 °F).

f. Rinse the reference electrode with deionized water prior to the next use.

7. Replace the electrodes on the instrument with the newly conditioned ones.
8. Calibration is performed as part of the electrode replacement.
9. If the calibration fails, repeat the calibration.
10. If data continues to be unstable after electrode conditioning, perform an electrode wash, then perform calibration.

Replacing ISE electrodes

Materials required:

Electrodes

- Cl (REF 07097504, PN 073-0049-01)
- K (REF 06135445, PN 073-0050-01)
- Na (REF 03092699, PN 073-0051-01)
- Reference (REF 00311764, PN 073-0653-01
- O-rings, 3 (REF 09955206, PN 073-0071-01)
- Philips screwdriver

BIOHAZARD

Wear personal protective equipment. Use universal precautions.

Time: 5 minutes
Analyzer mode: Manual operation

Replace the Na, K, and the Cl electrodes if the slope is incorrect or calibration continuously fails.

The acceptable ISE slope is between 45.0 and 63.0. Slopes outside of this range are flagged as shown in the table. A flagged slope fails the calibration. The slope limits are defined at the ISE Parameter Settings window.

Mark	ISE Slope Range
H	> 65.0
h	63.1 to 65.0
l	38.0 - 44.9
L	< 38.0

Replace the reference electrode when the reference electrode value is <500.

Checking the reference electrode value

1. At the Menu Panel, select **Maint.**, then select **ISE Monitor**.
2. At the ISE Monitor window, at the bottom of the Calib.monitor: Serum area, check the value of the Ref. electrode field.
3. If the Ref. electrode value is **less than 500.0**, replace the reference electrode.

Removing electrodes

1. At the Menu Panel, select **Maint.**, then select **ISE Operation**.
2. In the Period. wash area, select **OFF**, then select **Set**.
3. Using a Phillips screwdriver, remove the screws (**1**, see Figure 5-1) that secure the DPP shield to the analyzer panel.
4. Push the DPP shield to the right and slowly lift the DPP shield until it reaches approximately a 90° angle, then gently lift the tab of the DPP shield and remove.
5. Loosen the thumb screw and lift the ISE cover.
6. Disconnect the electrode connectors.
7. Remove the thumbscrew (**1**) to release the plate that secures the electrodes and the block containing the electrode. (See Figure 5-37.)
8. Remove the electrode to replace.

Installing electrodes

NOTE
Make sure the K and Na electrodes are conditioned. When the Cl and Ref electrodes are taken out of their packaging, they are wet. Wipe the Cl electrode thoroughly, and wash the Ref electrode using water.

NOTE
To store the reference electrode, refer to Storing the Reference Electrode on page 169.

1. Assemble the new electrodes in the correct order:
2. Set the electrodes in place, paying careful attention not to leave a space between them.

   Make sure there is an 0-ring between each electrode and that the ridges on the side of each electrode fits into the depressions on the side of the electrode next to it.

3. Tighten the thumbscrew while holding down each electrode with the retaining plate.

4. Insert the electrode connectors.

CAUTION

If a space exists between the electrode connections, the plate retaining the electrodes cannot close. If you cannot close it, move each electrode left and right little-by-little. **Do not** force the electrode. Fasten the thumbscrew tightly. If the retaining plate loosens during measurement, liquid could leak, causing a problem with the instrument.

Priming the ISEs

1. At the ISE Operation window, select **Execute** to the right of the word Initialize.
2. Select **Yes** when prompted to execute.
3. In the Bufferprime area, enter **3** into the Times field.
4. Select **Execute**, then select **Yes** when prompted to execute buffer prime.
5. Verify the liquid is discharged smoothly from the dilution bowl during priming.
6. If the liquid is increasing without being discharged, a leak exists, an electrode is incorrectly positioned, or a clog is in the drain system. If the liquid increases, immediately stop the instrument.

   IMPORTANT

   If clogging occurs, the most probable cause is that the flow path is clogged inside the electrode. Remove the Na and K electrodes, and check them by transmitted light to see whether the flow path is clogged or not. You cannot do this for the Cl electrode because of its construction. When in doubt, even if you cannot find a problem, try replacing the electrode.
7. Mount the stainless steel cover on the top of the ISE unit by sliding it inside and fasten the screw retaining the cover.

   NOTE

   When sliding it, be careful not to scratch the tubes or dilution bowl. When fastening the screw, verify that the cover is not caught in the groove and is not loose.
8. Reinstall the cover and tighten the screws.
9. Replace the DPP shield and secure it in place with the Phillips screw.
10. At the ISE Operation window, in the Initialize area, select **Execute,** then select **Yes**.

    NOTE

    The ISE wash is automatically turned on.
11. After initialization is complete, select **Exit,** then select **Yes**.

Calibrating the ISEs

1. At the Operation Panel, select **Initialize**.
2. At the Menu Panel, select **Maint.**, then select **ISE Operation**.
3. At the ISE Operation window, in the Calibration area, select **Execute**.
4. When prompted, select **Yes** to execute calibration.

5. If the calibration fails, repeat calibration again and if data continues to be unstable, perform an electrode wash.

   NOTE

   The electrodes may have to stabilize on the system before a successful calibration is achieved.

6. At the ISE Operation window, select the **Electrode Info** button and enter the new electrode information.

Storing the reference electrode

1. Remove the reference electrode from the ISE module.
2. Rinse the electrode with deionized water.
3. Place it into an appropriate container.
4. Cover the reference electrode with reference electrode filling solution.
5. Cover the container and store at 2 - 40°C (35.6 - 104°F).
6. When ready to use, rinse the electrode with deionized water.

   NOTE

   If the electrode is stored cold, allow time for it to equilibrate to room temperature before use.

Cleaning the dilution bowl and waste-drain nozzle

Materials required:

- Cotton stick
- Deionized water
- Household bleach
- Toothpick
- Philips screwdriver

Time: 45 minutes
Analyzer mode: READY

BIOHAZARD

Wear personal protective equipment.
Use universal precautions.

Cleaning the dilution bowl

1. At the Menu Panel, select **Maint.**, then select **ISE Operation**.
2. At the ISE Operation window, in the Period.wash area, select **OFF**, then select **Set**.
3. Using a Phillips screwdriver, remove the screws (**1**, see Figure 5-1) that secure the DPP shield to the analyzer panel.
4. Push the DPP shield to the right and slowly lift the DPP shield until it reaches approximately a 90° angle, then gently lift the tab of the DPP shield and remove.
5. Loosen the thumb screws, then remove the ISE cover.
6. Loosen the screw retaining the stainless steel cover at the top of the ISE unit, and remove that cover by sliding it toward you.
7. At the ISE Operation window, next to Final operation, type **16** in the field next to Pure water position.

8. Select container 1 setting for 10-mL tube.
9. Fill a 10-mL tube with deionized water and place it on the CTT tray in position 16.
10. At the ISE Operation window, in the Final operation area, select **Execute.**

    Water is dispensed into the ISE module.

11. To dissolve the crystals attached to the liquid-supply nozzle, let it stand for about five minutes.
12. At the ISE Operation window, in the Dil Bowl drain area, select **Execute**.

    The water in the dilution bowl drains.

13. Wipe up any water or dirty parts around the liquid-supply nozzle (**1**) using a damp cotton stick or similar material.

Figure 5-39. Location of the liquid-supply nozzle

14. At the ISE Operation window, enter **5** in the Bufferprime Times box, then select **Execute**.
15. When prompted, select **Yes** to execute a buffer prime.

Cleaning the waste-drain nozzle

CAUTION

Be careful not to scratch the nozzle. Damaging the nozzle may cause inaccurate results.

1. Using a blunt object such as a pipette, carefully scrape the crystals that are attached to the waste-drain nozzle (**1**).

Figure 5-40. Location of waste-drain nozzle

2. At the ISE Operation window, enter **5** in the Bufferprime Times box, then select **Execute**.

   IMPORTANT
   Verify that no buffer collects in the wash block. Buffer that remains in the wash block may clog the drain.

Maintaining the ISE unit after the dilution bowl and waste-drain nozzle are clean

1. Replace the stainless steel cover of the ISE unit by sliding it into place, then secure it with the retaining screw.

CAUTION
When sliding the cover, be careful not to scratch the tubes and dilution bowl. Also, when fastening the screw, verify that the cover is not caught in the groove and is not loose.

2. Reinstall the splash cover and the DPP probe shield.
3. At the ISE Operation window, in the Initialize area, select **Execute**.
4. When prompted, select **Yes** to execute.
5. At the ISE Operation window, in the Period.wash area, select **ON**, then select **Set**.
6. At the ISE Operation window, select **Exit**.
7. Perform calibration and run controls.

Recovering from a power failure

Preparing the system for an expected power outage

If you know in advance of an upcoming power outage:

1. Turn off the workstation and analyzer power by performing the normal shutdown operation.
2. If you expect the power supply to be off for a long period of time, refrigerate the reagents.

3. When the power returns, perform the normal startup operation.

Preparing the system for power return (if power was unexpectedly lost while system was on)

While the electrical power is still off, do the following:

1. Turn off the workstation power switch.
2. At the power panel, set the **Operate/Standby switch** to Standby.

When the electric power returns, do the following:

1. Turn on the workstation power switch.
2. When the Startup window opens, turn the **Operate/Standby switch** to Operate.
3. Select the **system reset** button on the analyzer unit power supply panel.
4. At the Startup window, enter a password.
5. Select **Re-Start**, then select **OK**.
6. If possible, repeat the task that you were performing prior to the power failure and verify that the data was stored.
7. If reagent was dispensed, you must perform a Weekly WASH2 before resuming operation.

Recovering from an unexpected power outage (after power returns, when power was unexpectedly lost while system was on)

1. If the Startup window is open, select **Shutdown** and perform the normal shutdown operation.
2. Turn off the workstation power and turn the Operate/Standby switch on the analyzer to **Standby**.
3. Wait approximately 20 seconds.
4. Perform the normal startup operation and open the Startup window.
5. At the Startup window, enter a password.
6. Select **Re-Start**, then select **OK**.
7. If possible, repeat the task prior to the power failure and verify that the data was stored.
8. If reagent was dispensed, you must perform a Weekly WASH2 before resuming operation.