Cleaning the internal optics surfaces

The face of the fiber-optic assembly and the lens are directly exposed to sample fluids inside the analyzer’s flow cell. Automatic rinse cycles use high-pressure rinse water to flush debris from these optics surfaces. However, rinse cycles usually do not prevent the build-up of biological films and mineral deposits on the surfaces. To maintain optimum performance, you must periodically open the analyzer and mechanically clean these surfaces as described below. It’s like you can rinse your teeth with water every day, but you really need the dentist to clean them periodically.

**Note:** The Clean parameter is a standard analyzer parameter that indicates the “cleanness” of the internal optics. You can view this parameter’s value using the Web Interface—see “Using the Web Interface” on page 41.

The internal optics should be cleaned at least monthly or when the parameter falls to near 0.45 or sooner if recommended by ZAPS. After a thorough cleaning and calibration, this parameter should increase nearer 1.00.

**Required materials**

**Caution:** When cleaning the optics, use only the tools and supplies included in the ZAPS optics cleaning kit, refill pack, or specified below. Other substances can damage the optical surfaces in the analyzer.

The following items are included in the ZAPS optics cleaning kit:

- Plastic cleaning tool
- Hex wrench (if needed)
- Nitrile rubber gloves
- Optical cleaning wipes
- Sterile cotton balls
- Cleaning liquid
- O-rings

In some situations described in the steps below, you may need to supply additional material:

- CLR Calcium, Lime & Rust Remover from Jelmar or equivalent hard-water cleaner (such as ZEP Calcium, Lime and Rust Remover from Home Depot)

A refill pack provides a supply of consumables from the optics cleaning kit. Contact ZAPS Technologies—see “Getting Support” on page 119.

**Reminder:** Every year, get an updated version of the optics cleaning instructions at the following location:

Cleaning process
The following steps require an Internet connection to the Web Interface—see “Using the Web Interface” on page 41.

Part 1: Use the Web Interface to prepare the analyzer
1. On a computer, log in to the analyzer web server and view the Web Interface screen.

Note: In the next step, the analyzer may take up to a minute or longer to respond, depending on the software version. Wait for the analyzer to respond.

2. Go to the Control tab and click Prepare the Station for a Manual Optics Clean. When the preparation is completed and the cleaning steps are displayed, continue below.

Caution: During the optics cleaning process, do not turn off or remove power from the analyzer—except during annual preventive maintenance. If you turn off the analyzer, the automatic calibration sequence may be disrupted when you resume operation.

Part 2: Remove the lens holder
3. Get ready to remove the lens holder:
   - **Important:** Turn off the sample and rinse-water supply lines. (If the drain line has a shutoff, turn it off also.)
   - Open the analyzer’s lower door.
   - Put on a pair of nitrile gloves.
   - Put one or two paper towels inside the bottom of the lower cabinet to catch and clean up the small amount of fluid that will drain out of the flow cell.

Caution: When removing or installing the lens holder in the flow cell, do not allow the lens to touch the sides of the flow cell. Any contact may contaminate or damage the lens and require replacement.

WARNING: For an analyzer with a motorized lens holder (XR assembly), pictured farther below, (1) do not unplug any of its cables, and (2) do not loosen the four long screws holding the motor. Otherwise, serious damage to the equipment is likely to occur.
4. On the bottom or side of the flow cell (see two examples below), use the knurled knobs or a hex wrench to remove the screws holding the base of the lens holder to the flow cell, then carefully pull the lens holder out of the flow cell.

5. Place the lens holder in a safe place (see the illustrations below):
   - For a fixed lens holder, stand it upright on its base in a safe place where it is protected from accidental contact—do not touch or bump the lens.
   - For a motorized lens holder, lay it on its side in the bottom of the lower cabinet—do not touch or bump the lens. Do not unplug any of the cables.

**Note:** If the lens holder was difficult to remove from the flow cell, or if the lens holder or flow cell has any mineral deposits on its surfaces, perform the following steps before continuing the cleaning process:

1. Thoroughly moisten an optical wipe with CLR Calcium, Lime & Rust Remover from Jelmar (or an equivalent hard-water cleaner, such as ZEP Calcium, Lime and Rust Remover).
2. Drape the CLR wipe over the cleaning tool and cotton ball (as shown farther below), then insert the wipe and tool into the flow cell and wipe the inside surfaces. Keep the wipe in contact with the surfaces for about 30–60 seconds.
3. Use the CLR wipe to wipe the lens and holder. Keep the wipe in contact with the surfaces for about 30–60 seconds.

After cleaning with CLR, perform all of the optics cleaning steps below—this will remove all traces of CLR.
Part 3: Clean the fiber-optic surface with cleaning fluid and tool

6. Get ready to clean the fiber-optic surface:
   - Vigorously shake the bottle of cleaning liquid included in the kit. Continue until no deposits remain at the bottom of the bottle.
   - Place a cotton ball in the center of a new optical wipe, then place the cleaning tool so one end touches the cotton ball. If the end of the tool is recessed, put the cotton ball in the recess. Drape the wipe over the full length of the tool.

   ![Optical Wipe Setup](image)

   **Caution:** Do not touch the fiber-optic surface with your hands or any other material except the special optical wipes provided in this kit. Use only the ZAPS optics cleaning liquid provided in this kit. Any unapproved material or cleaner may contaminate or damage the surface and require replacement.

7. Shake the special cleaning liquid, then use it to soak the wipe at the end of the tool.
8. Insert the cotton-ball end of the tool and wipe into the bottom of the flow cell until it touches the surface of the fiber-optic bundle inside at the top of the flow cell. (If the tool is too long to fit, cut it off shorter.)
9. Twist the tool and wipe several times while pushing inward. Make sure the wipe turns with the tool. Then remove the tool and wipe.
10. Repeat steps 7–9 using a new wipe.

Part 4: Clean the lens, holder, and O-ring, then install

**Caution:** Do not touch the lens with your hands, gloves, or any other material except the special optical wipes provided in this kit. Use only the ZAPS optics cleaning liquid provided in this kit. Any unapproved material or cleaner may contaminate or damage the surface and require replacement.

**Caution:** If the lens is partially covered by a plastic cap, clean the exposed surface of the lens using only a *clockwise* motion. Otherwise, the cap could be loosened or unscrewed.

11. Wet a new optical wipe with the special cleaning liquid, then use it to thoroughly scrub the face of the lens using only finger pressure.
12. Clean the body of the lens holder (the part that fits inside the flow cell) by wiping it with the same optical wipe.
13. If required, remove the old O-ring from the base of the holder and install a new O-ring from the kit. If several sizes are included, choose the same size as the old O-ring.
14. Wipe any debris from the O-ring and insert the lens holder into the flow cell—do not touch or bump the lens.
15. Install the screws that fasten the holder to the flow cell. Tighten them sequentially to compress the O-ring evenly: *Hand-tighten all screws—then, for screws with hex-socket heads, tighten about ¼ turn more on each screw using a hex wrench (you should feel increased resistance at each screw).*

Screws with plain heads

Screws with hex-socket heads

16. Get the analyzer ready to restart:
   - In a convenient location, record the date you cleaned the optics.
   - Clean up and close the analyzer cabinet.
   - Turn on the sample and rinse-water supply lines. (If the drain line has a shutoff, turn it on also.) Check for leaks.
   - If the analyzer is powered off, turn it on.

**Part 5: Restore normal operation**

17. On the Control tab of the Web Interface, click **Manual Optics Clean Complete**. Wait for the progress bar to complete and display the normal Control tab. The status initially shows the calibration activity, then eventually changes back to normal (taking measurements).

18. Check the Web Interface after 15–30 minutes to verify the cleaning was good. Depending on the software version, the calibration could take up to 30 minutes before parameter measurements resume.

**Caution:** During the first 15–30 minutes of the calibration, the analyzer checks the effectiveness of the cleaning. *If the cleaning is not adequate, operation stops and a message is displayed on the Web Interface and front-panel display telling you to repeat the entire cleaning process.* In this situation, operation will not resume until you clean the optical surfaces thoroughly.

**Important:** Notify ZAPS Technologies if you installed any new hardware as part of this maintenance. ZAPS will update the analyzer software to account for the new hardware.