

Periodic Maintenance Summary

for the CombiFlash® Companion®

Chromatography Technical Note
TN07

Overview

The following sections describe periodic maintenance tasks to be performed on the Companion.

Tools and Supplies

Necessary tools and supplies include the following:

- Upchurch flushnut fitting tool, Teledyne Isco Part Number 209-0164-15
- Phillips #1 and #2 screwdrivers
- 5/16" nut driver
- 1/4" nut driver
- For Annual Maintenance, Teledyne Isco Periodic Maintenance Kit Part Number 68-5237-011, which contains:
 - Deuterium lamp
 - Pulse damper diaphragm and Kalrez Seal®
 - Mixing chamber o-ring
 - Solid sample cartridge cap o-ring 5g and 25g
 - Outlet check valve for waste line
 - Test Sample A Kit, Part Number 68-3877-010
- For Semi-Annual Maintenance, Teledyne Isco Periodic Maintenance Kit Part Number 68-5237-012, which contains:
 - Solid sample cartridge cap o-ring 5g and 25g
 - Outlet check valve for waste line
 - Test Sample A Kit, Part Number 68-3877-010

Cleaning

For general cleaning of the enclosure, use water with a mild detergent. Use a small amount of isopropyl alcohol for tougher stains.

On printed areas, such as the inject/equilibrate labeling for the Operation Mode knob, avoid rubbing vigorously or using aggressive solvents like acetone, either of which will ruin the printed text.

CAUTION

Do not immerse the instrument in a water bath. The instrument is not watertight and this action could damage the internal electronics.

Flow Cell Cleaning

The Companion may alert you that flow cell cleaning is recommended (Figure 1). This alert message appears when flow cell is partially obstructed but the system is still operable.

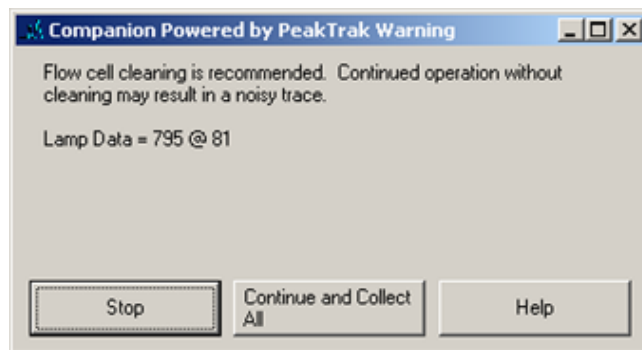


Figure 1: Flow Cell Cleaning Alert

Monthly cleaning of the flow cell will keep the amount of noise on the absorbance trace to a minimum and ensure accurate peak detection.

To clean the flow cell:

1. Remove the column from the system and insert a bypass (priming) tube.
2. Pump 500 ml of solvent through the system at 100 mL/min. Generally, the recommended solvent is the strongest solvent you have recently used. For example, in a hexane and ethyl-acetate application ethyl-acetate is stronger. Therefore, ethyl-acetate (often solvent B) would be used. See Table 1 for alternative solvents.
3. Using methanol is always a good idea. It is miscible with most LC solvents and is fairly innocuous. It will force other solvents through the system so that they will not interfere with the next sample.

Note

Remove the methanol by flushing with the desired solvent.

4. Replace the bypass tube with a column and start a run. The Companion will attempt to calibrate the flow cell.
 - If the calibration is successful, the system is ready for use.
 - If the alert message persists, refer to the alternative flow cell cleaning solvents and techniques.

The solvent strength and high flow rate will typically clear the obstruction and return the flow cell to optimum performance.

Alternative Flow Cell Cleaning Techniques

If the flow cell cleaning instructions do not clear the obstruction, you can modify the steps, select a different solvent, or use a combination of solvents and techniques as needed.

Some alternative techniques:

- After the lines have been filled with solvent, pause or reduce the flow rate. Doing so will allow the solvent to remain longer to dissolve the obstruction.
- Start with methanol in case there is any silica present in the system. Methanol works well because it breaks down the tertiary structure of silica and allows it to flush through. Methanol must be removed by flushing with the desired solvent.
- Use a syringe to inject the desired solvent into the lower column mount. Then, reattach the bypass line and the solvent will be forced through the system. The advantage is that very little solvent is required and repriming is not necessary.

Table 1: Suggested Flow Cell Cleaning Solvents

Solvent	Description
Acetone or Dichloromethane (DCM)	Effective at solubilizing organic molecules.
Acetone or Dimethylsulfoxide (DMSO)	Strong solvent that will clear organic sample
Dimethylformamide (DMF)	Strong solvent if other solvents do not produce the desired results.
Tetrahydrofuran (THF)	Strong solvent.
Mildly acidic aqueous solution	0.5M acetic acid in distilled water can be used to clear samples that are not removed by organic solvents.
Mildly basic aqueous solution	A dish-type detergent solution can wash through particulates not picked up by the acidic solution. The emulsification effect of detergent is an effective tool as well to help wash through oily samples. Follow the detergent with several minutes of clean, distilled water. Note: If the next set of solvents to be used are normal-phase, flush with alcohol to remove all water.

Summary of Maintenance Procedures

Periodic maintenance is described in the following sections. Following each annual and semi-annual maintenance service, post-maintenance calibration and testing must be performed. See the Companion Service Guide for more information.

Annual Maintenance

- Yearly maintenance scheduled with Teledyne Isco Service
Contact us at:
(800) 775-2965 or (402) 464-0231
- Deuterium lamp replacement
- Pulse damper diaphragm and seal replacement
- Mixing chamber o-ring replacement
- Solid sample cartridge cap o-ring (newer systems) or seal (older systems) replacement
- Waste line outlet check valve replacement

Semi-Annual Maintenance

- Solid sample cartridge cap o-ring (newer models) or seal (older models) replacement
- Waste line outlet check valve replacement

Monthly Maintenance

- Delete unneeded data from the Companion's hard drive.
- Clean the flow cell according to the instructions in *Flow Cell Cleaning*.

The CombiFlash Companion user should visually inspect the solvent, waste, and drain tubing monthly. The tubing must be free of any damage, kinks, or deterioration. Fittings should show no signs of leaks.

The top shelf drain (Figure 2) and fraction collector drain (Figure 3) should also be inspected at this time. These drain holes should be clear of any debris.

Correct any deficiencies before returning the instrument to operation.

WARNING

Risk of fire or equipment damage. Faulty tubing, fittings, and drains may allow organic solvents to pool in unsafe areas, creating a potential for dangerous levels of flammable vapors. Improper draining may damage the instrument's internal components.

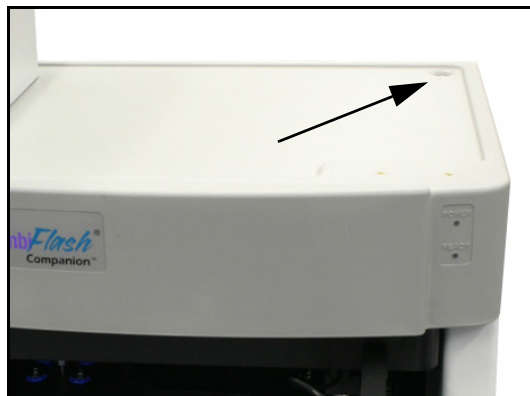


Figure 2: Platform Drain

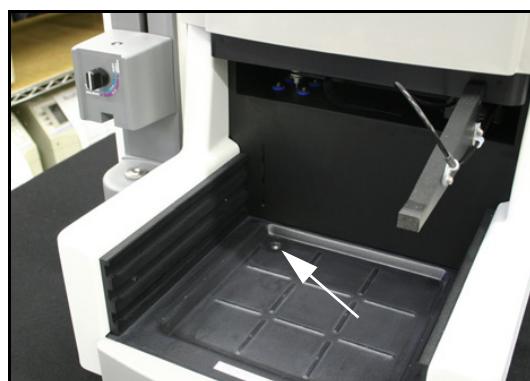


Figure 3: Fraction Collector Drain

Weekly Maintenance

- Clean the solid load cartridge line.
 - Place an empty solid load cartridge in the Companion and a bypass tube in the column holder. Run 100% Solvent B for one minute at 50 ml/minute.
 - Set the valve to liquid injection. Use a syringe to inject 20 ml of methanol. Let set for several minutes, then inject 20 ml of Solvent A to flush out the methanol.

Daily Maintenance

- Clean up spills
- Remove filled fraction tubes
- Turn off Companion nightly

Safety Warnings, Cautions, and Notes

Before performing any removal or replacement procedures, read the following warnings, cautions, and notes.

WARNING

All removal and replacement instructions are to be performed with power removed. Turn the power switch to the off position and disconnect the mains power cord.

CAUTION

Electronic components can be damaged by electrostatic discharges. When working inside the Companion enclosure, or when handling electronic components and its wiring connections, always discharge any electrostatic build up. This can be done by momentarily touching a grounded metal surface with your hand. Tools should also be discharged by contacting a grounded surface before working on the instrument.

CAUTION

Several procedures may require moving the Companion to a more suitable work area (e.g. out of a fume hood). If so, two people should be available to lift the Companion.

Note

If removed, nylon lock nuts should be replaced. Do not reuse.

Note

Use Loctite[®] 425 thread-locking compound or equivalent on all metal threaded hardware.

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