


Best practices for dispensing with the Multidrop Combi nL Reagent Dispenser

Introduction

When using the Thermo Scientific™ Multidrop™ Combi nL Reagent Dispenser, it is recommended to properly prepare and clean the tubing and dispensing valves to maintain accurate and reproducible performance. Following these guidelines will help ensure the unit, tubing, and valves remain properly cared for and provide years of service.

General dispensing guidelines

- Keep particles like dust from entering the tubing
 - Don't touch the orifice of the dispensing valves or the tubing inlet
 - Filter all reagents, detergents, solutions, and water
 - Don't allow solutions to stand in the tubing for long periods; prime and dispense frequently
 - Prime the tubing with enough volume to eliminate bubbles before dispensing
 - Glass reagent bottles in 250 mL (Cat. No. N09504) and 1000 mL (Cat. No. N09505) sizes are available for solutions that may react with the polypropylene bottles supplied with the unit
 - When feasible, use a dedicated unit for challenging (e.g., protein, DMSO) solutions
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- Dispensing tips for typical solutions
 - Rinsing or priming with water may affect the concentration of DMSO because DMSO is highly hygroscopic
 - Avoid using ethanol to rinse the tubing after dispensing solutions containing protein, to avoid precipitation; rinse first with a mild detergent, then distilled or filtered laboratory-grade water
 - When dispensing enzymes or substrates, rinse the tubing with ethanol for inactivation before using the unit to dispense a different liquid
 - When dispensing salt buffers, always flush tubing with distilled or filtered laboratory-grade water after use
 - Rinse the tubing with distilled or filtered laboratory-grade water after using the instrument

Daily cleaning of dispensing valves

- Clean valves thoroughly by dispensing distilled or filtered laboratory-grade water through the tubing. Confirm that all valves are cleaned properly by ensuring that no droplets form at the end of the valves and that valves do not dispense liquid in vertical streams. If droplets and vertical streams are present, refer to the backflush and tip wash procedure sections in this document.
- Use a minimum of 10 mL distilled or filtered laboratory-grade water for washing. If cleaning with water is insufficient, use a mild laboratory detergent such as $\leq 1\%$ Tween™ 20 or Triton™ X-100 detergent, or a cleaning solution (e.g., 1% Cole-Parmer™ Micro-90™ solution). Then flush with a large amount of water.
- Clear the tubing of water by pressing the EMPTY button.

Hint: Put the cleaning solution or mild detergent in a 50 mL conical tube. Place the tube inside the 250 mL reagent bottle and insert the tubing with the filter into the tube to create the vacuum when the cap is sealed (Figures 1, 2). This reduces the amount of solution required and saves the effort of cleaning the reagent vessel. Once the first solution has been used to rinse the tubing, switch to distilled or filtered laboratory-grade water and rinse the tubing and dispensing valves thoroughly.



Figure 1. Inserting 50 mL conical tube into reagent vessel.



Figure 2. Inserting tubing into 50 mL conical tube.

Maintenance

- If you suspect that foreign particles have entered the tubing, clean the tubing. Check the reagent filter weekly, wash it regularly, and replace it when necessary. It is acceptable to clean the reagent filter with an ultrasonic cleaner.
- Ensure that the reagent does not contain any particles $>50 \mu\text{m}$ and that the liquid container is securely closed during use. Avoid inadvertently allowing dust particles to be transferred from the benchtop or lab air filtration system to the reagent bottle.
- Depending on the frequency of use, inspect the tubing and tips at least once a month. Mainly check any components that are in the liquid path of the solution.
- It is good laboratory practice to periodically clean the outside of the instrument with a cloth dampened with water, 70% ethanol, or a mild detergent. Refer to the decontamination instructions in the Multidrop Combi nL User Manual.

Backflush procedure

Perform the following procedure to remove foreign particles from the dispensing valves and tubing:

1. Press the EMPTY button to drain the reagent bottle. Remove the reagent filter by carefully pulling it off the end of the cap tubing. Replace the cap securely on the reagent bottle.
2. Place a disposable reservoir filled with 20–50 mL of a filtered, mild detergent (e.g., $\leq 1\%$ Tween 20 or Triton X-100 detergent) or a cleaning solution (e.g., 1% Micro-90 solution) up to the valves so that the tips are submerged in liquid (Figure 3).



Figure 3. Cleaning dispensing valves with solution in reservoir.

3. Press and hold the EMPTY button to flush the mild detergent or cleaning solution through the valves and tubing into the reagent bottle. Release the EMPTY button when done.
4. Place another disposable reservoir with distilled or filtered laboratory-grade water under the dispensing valves so that the liquid is in contact with the valves.
5. Press and hold the EMPTY button to flush the water through the valves and tubing. Release the EMPTY button when at least 50 mL has been used.
6. Empty the reagent bottle. Repeat steps 4 and 5. Rinsing the liquid path twice with water ensures there is no residual detergent or cleaning solution on the outside surface of the tubing that is exposed while cleaning with the first vessel of water.
7. Empty the reagent bottle and clean the bottle, then clean the reagent filter as needed and reattach it to the cap tubing. Reattach the cap to the reagent bottle.

Decontamination/disinfection procedure

The following procedure is used to disinfect tubing and dispensing valves:

1. Clean the dispensing valves thoroughly with a mild detergent and distilled or filtered laboratory-grade water.
2. Prime with distilled or filtered laboratory-grade water.
3. Prime with a decontamination solution (e.g., 70% ethanol, 4% Decon™ 90 solution). Adequate priming is achieved when the priming vessel is full. Let the solution remain in the dispensing tubing for about 15 minutes.
4. Prime the tubing again with distilled or filtered laboratory-grade water.

Warning: Do not use bleach to clean the dispensing valves, as it may react with sensitive substances (e.g., cells). Even if the bleach is rinsed with copious amounts of distilled or filtered laboratory-grade water, the effectiveness of completely removing the bleach has not been tested.

Troubleshooting dispensing issues

Inconsistent dispensing is often due to dripping or clogged dispensing valves. The most common cause of dispensing issues is clogging, which is most often caused by the use of alcohol to rinse the tubing after dispensing protein-based solutions. Alcohols such as ethanol and isopropanol precipitate proteins. If ethanol is used to wash the tubing, the tubing needs to be rinsed with large amounts of water. Always maintain your tubing and dispensing valves and inspect them before use to catch a potential clog before it damages the valves.

Clogging can easily be identified as either a droplet that forms on the orifice of the tip (dripping or leaking) or a stream of liquid that dispenses at an angle. This is typically caused when debris is stuck inside and holds the valve open. If a clog occurs, two procedures can be used to clean the dispensing valves: backflushing and tip washing.

Two main features of the tip wash function are removing persistent air bubbles from the tubing and solenoid valves, and opening clogged dispensing valves. Start by using the tip wash procedure to eliminate bubbles in the tubing or a clog in the valve. If the tip wash procedure does not resolve either issue, then use a cleaning method (backflush) incorporating a reservoir with solution or mild detergent. For resistant clogs, refer to the backflush procedure described previously in this document.

Hint: Before the actual dispensing is performed, the tip wash function can be used.

If the dispensing valve is clogged and cannot be cleared by following the recommendations above, the valve will need to be replaced. As a last option try sonicating the valve. If this method still does not clear the clog, then a valve replacement is the only other option. Valves cannot be autoclaved. Refer to the detailed valve replacement instructions in the Multidrop Combi nL User Manual.

Tip wash procedure

The tip wash feature provides a quick method to keep the dispensing valves clean and clear of potential clogs. When using this feature, liquid is forced at high pressure through the valves one at a time in sequence. Pulsing action performed through each individual tip position helps to maintain maximum flow through the valve.

1. Use the current solution being dispensed, or empty and refill the reagent bottle with distilled or filtered laboratory-grade water.

Note: It is possible to remove the reagent filter for this procedure, but it is not recommended.

2. Press and hold the TIP WASH button (Figures 4, 5).
3. Run the tip wash function for 1–2 minutes or until you clear the clog in the specified tip. Once you release the TIP WASH button, the pulsing stops.

Caution: Only use distilled or filtered laboratory-grade water; if regular tap water is used, the valve could become damaged and require replacement.



Figure 4. TIP WASH button on keypad.



Figure 5. Dispensing valve in position 7 firing in the tip wash procedure.

Storage

When the unit is not scheduled to be used for long periods of time, wash the tubing with 70% ethanol or isopropanol, and run the tubing dry to avoid development of microbial growth.

Note: Ethanol helps to dry as well as sterilize the tubing. However, some chemicals may dissolve in ethanol or isopropanol.

Additional tips and tricks

- When dispensing is completed for the day, clean the tubing by priming with a mild detergent such as $\leq 1\%$ Tween 20 or Triton X-100 detergent, or with a cleaning solution such as 1% Micro-90 solution. Run approximately 2 mL or more through the tubing.
- After using a mild detergent, prime the tubing with distilled or filtered laboratory-grade water and repeat this step using a new vessel of water to prevent detergent carryover.

Additional cleaning instructions and maintenance

For additional detailed information on proper cleaning and maintenance of the Multidrop Combi nL dispenser, please see:

- Cat. No. N07171, Rev 1.1: Thermo Scientific Multidrop Combi nL User Manual
- Cat. No. N09467, Rev 1.0: Thermo Scientific Multidrop Combi nL Short Maintenance Guide
- Cat. No. N07494: Replacement Multidrop Combi nL Reagent Dispensing Valve

Find out more at thermofisher.com/multidrop