BASi

UniSwitch Syringe Selector

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MD-1508
User's Guide

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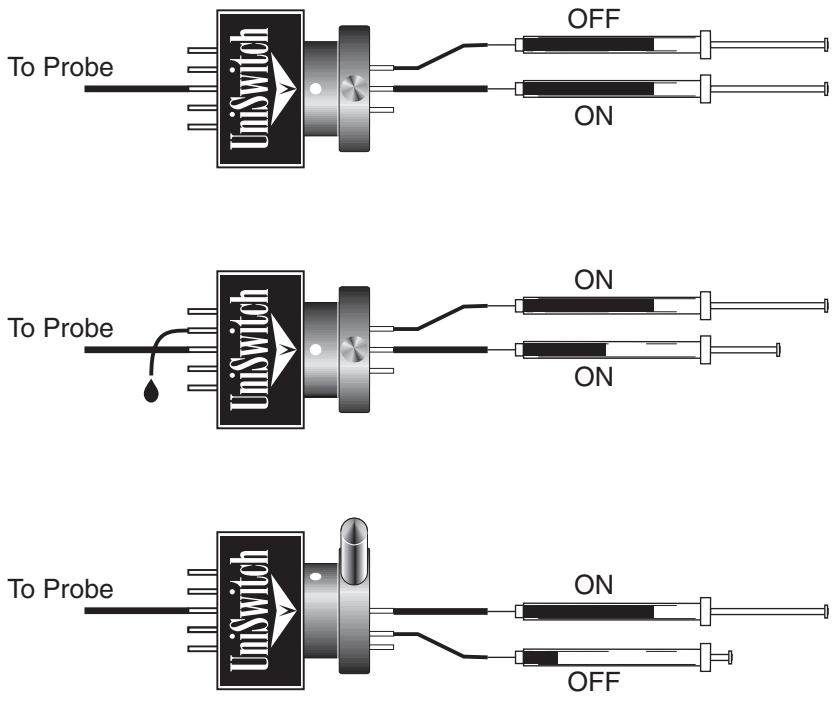
Syringe pumps are designed to deliver fluid from a mounted syringe at a constant flow rate by controlling the forward movement of the plunger. Consistent flow is required for microdialysis sampling experiments. The rate of analyte diffusion across the dialysis membrane is correlated to the flow rate of fluid through the probe. If the flow is erratic, the diffusion rate will also be erratic. This will be reflected in high variation of the analyte concentration in the dialysate.

Changing syringes during a long-term microdialysis experiment can cause flow to stop while tubing is moved from one syringe to another syringe. Air may also be introduced into the fluid stream. Air bubbles may become trapped against the interior of the dialysis membrane and impede recovery in that region of the membrane.

The UniSwitch was developed to allow a syringe change during microdialysis or other perfusion experiments without interrupting fluid flow or introducing air bubbles into the system. The UniSwitch extends perfusion beyond the limit imposed by syringe volume. The user can begin perfusion with one syringe, and switch over to another as the first syringe empties. This encourages using smaller syringe sizes for better pump performance, without sacrificing perfusion time due to smaller syringe volume.

Applications

- Switch between different types of perfusates in different syringes.
- Extend perfusion times indefinitely by switching between syringes.
- Flush a system with a larger-volume syringe, and then switch over to a smaller syringe for perfusion without introducing air into the system.

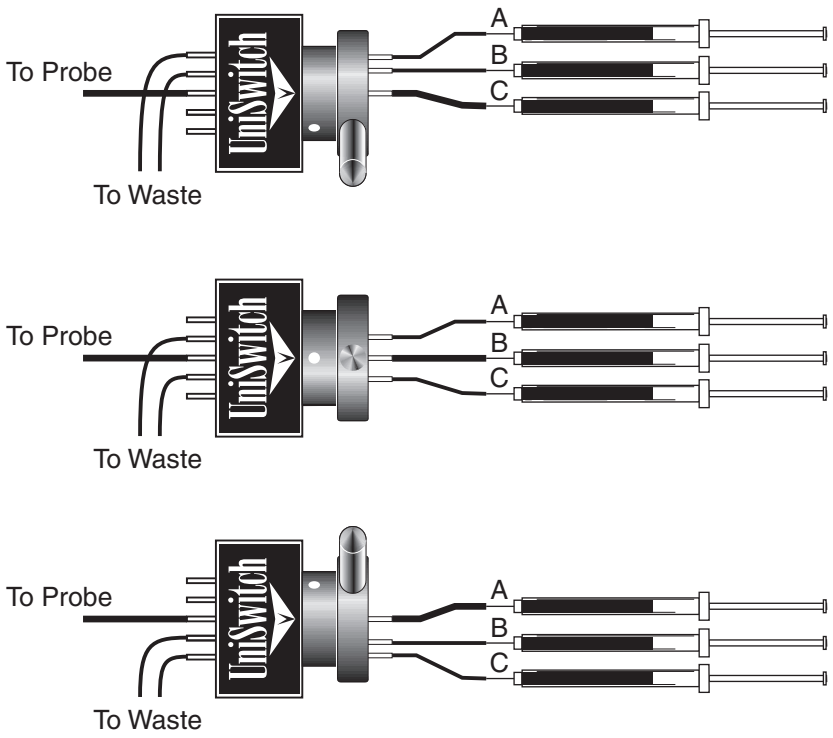


F1. Syringes on two independent pumps are attached to the UniSwitch. Before the first syringe is empty, the second pump is started to purge air from the tubing and cannula. The switch is made to the second syringe without stopping flow. The first syringe can now be refilled. Up to three syringes can be connected to the UniSwitch.

Design

The inlet side of the UniSwitch has three stainless steel cannulas. These are connected to as many as three syringes mounted on one pump, or on independent pumps operating at the same flow rate. The outlet side has five cannulas. The center cannula is routed to the destination device (eg, microdialysis probe). The pairs of cannulas on either side are normally used for waste.

Flow from each syringe is aligned with the center outlet cannula by moving a lever on the UniSwitch. Figure 2 demonstrates the flow path of fluid from three syringes through the UniSwitch at each position setting. An alignment dot on the UniSwitch rotor indicates which syringe is being routed to the destination device.



F2. Changing Perfusion Fluid with the BASi UniSwitch. Three syringes mounted on independent syringe pumps (in this example) are connected to the UniSwitch. Only one syringe is delivering fluid to the probe at a time. The white dot is aligned with the perfusing syringe. To switch syringes, pull the lever until the white dot aligns with the appropriate syringe. If the other pumps are operating, the fluid will be routed through the waste channels. To conserve perfusion fluid, non-perfusing pumps can be turned on just before they are needed in order to flush air from the lines.

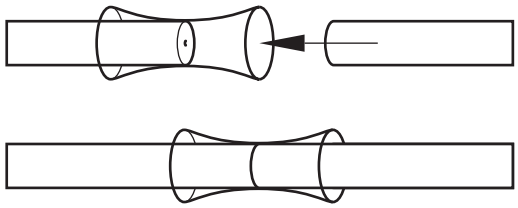
Specifications

Inlet Cannula: 2.92 ml
Outlet Cannula: 1.58 ml
Dead Volume: 0 ml

The UniSwitch is a zero-crossover device with no unswept volume.

Operating Instructions

1. Remove the package containing the FEP Teflon tubing and flanged tubing connectors from the shipping box. Two meters of tubing are provided. Determine the desired length of tubing required to connect:
   - Each syringe to an inlet cannula
   - Center outlet cannula to destination device
   - Four waste cannulas to waste vessel
2. Cut tubing to the desired lengths using a razor blade or sharp scalpel. Make a clean, blunt, perpendicular cut. DO NOT USE SCISSORS!
3. Soak the tubing connectors in alcohol for a minimum of 10 minutes before using them. This will cause them to expand and fit more easily over the tubing and cannulas. As the alcohol dries, the tubing connectors will shrink, creating a tight seal.
4. Load the filled syringes into the syringe pumps.
5. Connect the syringes to the three inlet cannulas using the flanged tubing connectors and tubing provided with the UniSwitch. Create connections with no gaps. The tubing connectors will stretch slightly as you place them over the tubing and the needles on the syringes. Make a tight connection with no dead space between the tubing and the syringe needle, as shown in Figure 3.



F3. Make a zero-dead-volume connection between the tubing and the syringe needle (or other cannulas) using the flanged tubing connectors. (Treat UniSwitch cannulas gently when connecting or removing tubing.) Slide connectors parallel to cannula until the tubing touches the cannula end. Avoid bending.

6. Holding the base of the UniSwitch with one hand, move the lever to either the far right or the far left.
7. Start the syringe pumps. Fluid should flow from three of the outlet cannulas (center cannula and two on the far side).
8. Move the lever to the center position, until the white dot aligns with the arrow on the top of the UniSwitch. You should hear a light click when the lever is properly in place. Fluid should now be flowing from the three center cannulas.
9. Switch the lever to the final position and check flow again according to the flow diagram in Figure 2.
10. Once flow has been confirmed, stop all the syringe pumps.
11. Connect the destination device to the center of the five outlet cannulas using the same procedure you used to connect the syringes to the UniSwitch (see step 5).
12. Connect the waste cannulas to FEP Teflon tubing using the same procedure as the step above. The ends of the waste cannulas may drain into a small beaker or vial. Do not submerge the ends in the waste fluid.
13. Turn the lever to align the UniSwitch with the desired syringe. Start the flow again. Check tubing connections and correct them if leaks are observed.

Care and Maintenance

After use, immediately replace each syringe with a syringe filled with filtered, distilled water, and flush the UniSwitch thoroughly. During flushing, turn the lever to each position in turn, so that all five outlet cannulas are flushed. If the switch is not flushed throroughly, salt crystals will form as perfusion fluid evaporates. This can block cannulas and scratch inner seals, causing permanent damage to the UniSwitch.

Wipe away any spillage during and after use. Clean the exterior of the UniSwitch by rinsing with distilled water. Do not use alcohol or other solvents. Allow the UniSwitch to dry completely before storing.

For extended storage, replace the device in its original blue shipping box, using the foam insert provided. This will prevent damage to the cannulas and keep the UniSwitch in a dust-free environment.

Warranty

The UniSwitch is warranted for a period of six months after the date shipped from BASi against defects in material or workmanship. BASi is liable only to the extent of replacement of defective items for claims registered within 30 days of the shipping date. BASi will not be liable for any personal injury, property damage, or consequential damages of any kind arising from use of the UniSwitch. This warranty does not cover damage to inner seals or cannulas through lack of proper maintenance or inappropriate handling by the user. The foregoing warranty is in lieu of all other warranties expressed or implied but not limited to the implied warranties of merchantablility and fitness for a particular purpose.

Ordering information

MD-1508 UniSwitch Syringe Selector (includes 2 meters FEP tubing and 12 flanged tubing connectors)

MF-5164 FEP Teflon Tubing, 0.65 mm OD x 0.12 mm ID, 1 M

MD-1511 PEEK Tubing, Blue, 0.65 mm OD x 0.12 mm ID, 1 M

MD-1512 PEEK Tubing, Red, 0.65 mm OD x 0.12 mm ID, 1 M

MD-1510 Flanged Tubing Connectors, 20/pkg

NOTE: FEP tubing is most commonly used for microdialysis. PEEK tubing offers an alternative material which is less flexible but also less light- and oxygen-permeable than FEP.