

SOP: NE-4000 Two Channel Syringe Pump

Purpose: Control the flow rate of fluids for microfluidic applications

NOTE: These are abbreviated instructions for the two-channel syringe pump. Refer to the full manual for additional details and functionalities: <https://www.syringepump.com/download/NE-4000%20Syringe%20Pump%20User%20Manual.pdf>

Location: BHE B8 (main area)

PPE: Flame-resistant lab coat; nitrile gloves; long pants; closed toe shoes

Protocol for Use:

1. Turn on the syringe pump by flipping the switch on the back left-hand side of the instrument.
2. The display panel will show a number blinking and indicator lights for volume (mL or μ L) and time (min or hr). Press any key to stop the display from blinking (**Figure 1**).

NOTE: The volume and time units correspond to volume per time or volumetric flow rate (e.g. mL/min).

3. Ensure that the number in the display panel corresponds with the value mentioned in the protocol. If not, use the up-arrow keys to change individual digits.
4. Ensure that the units for volumetric flow rate are correctly indicated. If not, press the “Rate” button twice until the display shows “Unts” and the indicator lights are blinking. Use the up-arrow key to toggle across the various rate units. Once the correct volumetric flow rate unit is selected, wait until the blinking stops.
5. Press the “Diameter” key and ensure that the correct inner diameter value is displayed. The indicator light for “mm” should be on (**Figure 2**).
 - a. For 1mL syringes, the inner diameter value is 4.78mm; for 5mL syringes, the inner diameter value is 12.07mm; for 10mL syringes, the inner diameter value is 14.5mm; for 60mL syringes, the inner diameter value is 26.72mm.
6. After all the settings are complete, remove the piston from the syringe. Then attach the adapter onto the nozzle of a syringe and place the syringe over some paper towels or Kimwipes.



Figure 1: Syringe pump that is powered on with a number in the display panel and indicator lights for specified units of volume and time.



Figure 2: The settings for inner diameter of a 10mL syringe.

7. Load the required volume of fluid into the syringe, as indicated in the protocol. Some of the fluid will drip out for a while and then stop. Use paper towels or Kimwipes to clean.
8. Insert the piston back into the syringe just enough for the syringe to attach.
 - a. When this happens, ensure that there are paper towels or Kimwipes to clean up the fluid that ejects. Pressure inside of the syringe will release some volume of fluid.
9. Cut out an appropriate length of plastic tubing (1.5mm inner diameter) and insert the adapter into one end of the tubing.
10. If applicable, load an additional syringe with another fluid following steps 6 – 9.
11. After the syringe has been prepared, turn and lift the driver release knob on top of the syringe pump to freely move the pusher. Initially, move the pusher all the way to the left-hand side.
12. Lift up the clamp in the syringe retainer bracket and place the syringe barrel in the bracket. Once the syringe barrel is secured, place the clamp on top of the syringe barrel ensure no movement during the pumping process.
13. Move and align the pusher so that the flat end of the piston rests securely on the pusher slot.
14. Insert the other end of the tubing into the inlet of the microfluidic device and place everything on top of an absorbent mat. The final set-up is shown in **Figure 3**.
15. Press the “Start/Stop” button to start the pumping process. The fluid should flow through the entire microfluidic device (**Figure 4**).
16. After the process is complete, flow some MilliQ water to flush out the fluid. Afterwards, flow air (no fluid in syringe) through the microfluidic device to flush out the MilliQ water.
17. Remove the syringe, move the pusher back to the right-hand side, and turn off the syringe pump by flipping the on/off switch in the back.

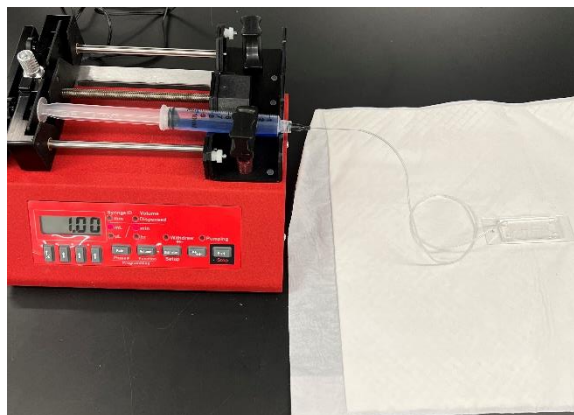


Figure 3: The set-up of the syringe, plastic tubing, and microfluidic device.

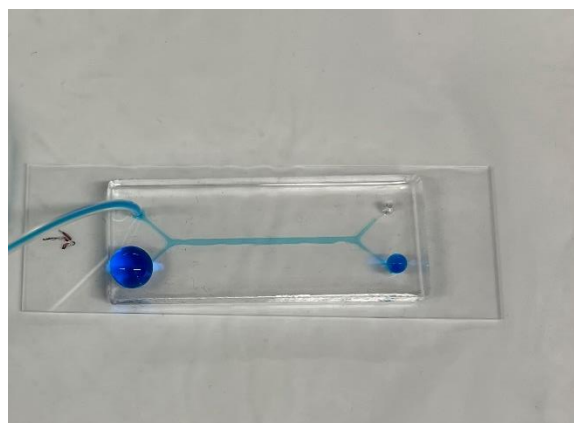


Figure 4: Fluid flowing across the entire microfluidic device.

Maintenance Schedule:

With each use: move the pusher back to the right-hand side and lock the driver release knob.

Contact Information:

Lab Manager: Nathan Cho, BHE B9, (213) 740-2093

Professor: Megan McCain: DRB 140, (213) 821-0791

Vendor Information: New Era Pump Systems Inc., (631) 249-1392, info@syringepump.com