Fly Sorter

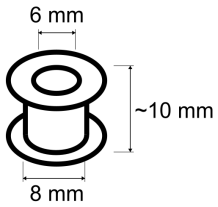
Technical Information and Manual

Aim: The Fly Sorter was designed to speed up sorting *Drosophila melanogaster* flies into categories (e.g. by gender or phenotype) using a handheld vacuum device with 2 chambers.

Quick build (Falcon only)

Material needed:

- 2x 50 ml Falcon Tubes
- 4x silicone cable grommets (inner ø = 6 mm, outer ø = 9 mm)



- A piece of cardboard (~12 cm x ~4 cm)
- Some standard laboratory tape
- T-piece tube connector (ø 5 mm)

- 2x plastic hose clamp

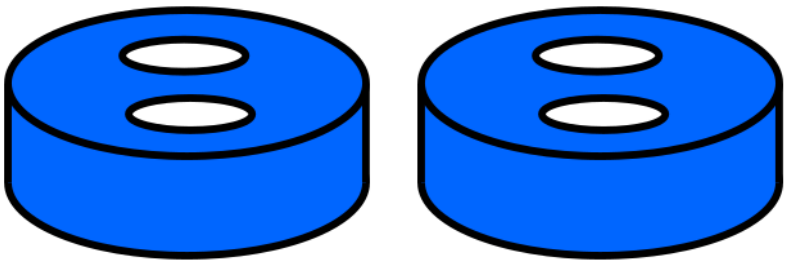
- Drill with 9 mm drill bit

Tubing:

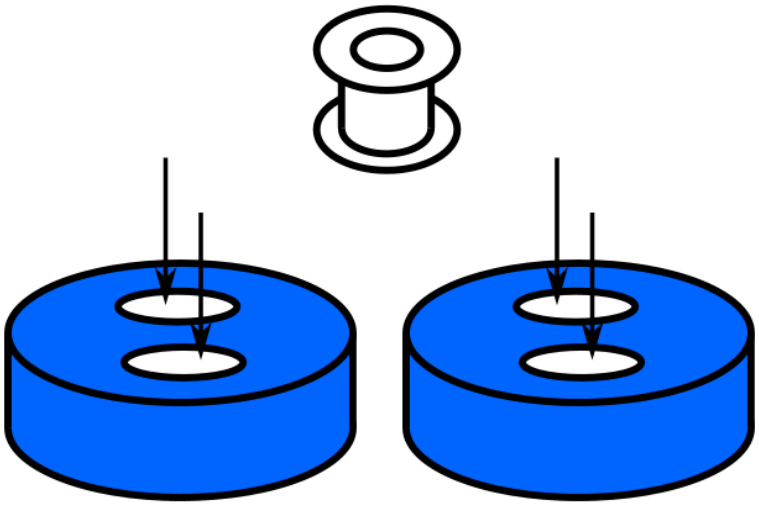
- Stiff tubing (inner ø = 4 mm, outer ø = 7 mm)
    - 2x ~7 cm
    - 2x ~20 cm
- Flexible Tubing (ø = 4 mm, outer ø = 7 mm)
    - 2x ~25 cm
    - A longer piece to connect to the vacuum

Building Instructions

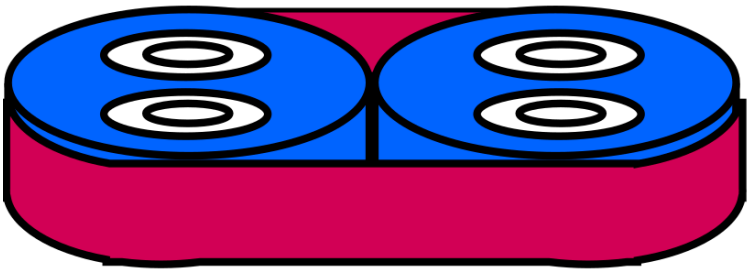
1. Drill 2 holes into each of the Falcon Tube caps



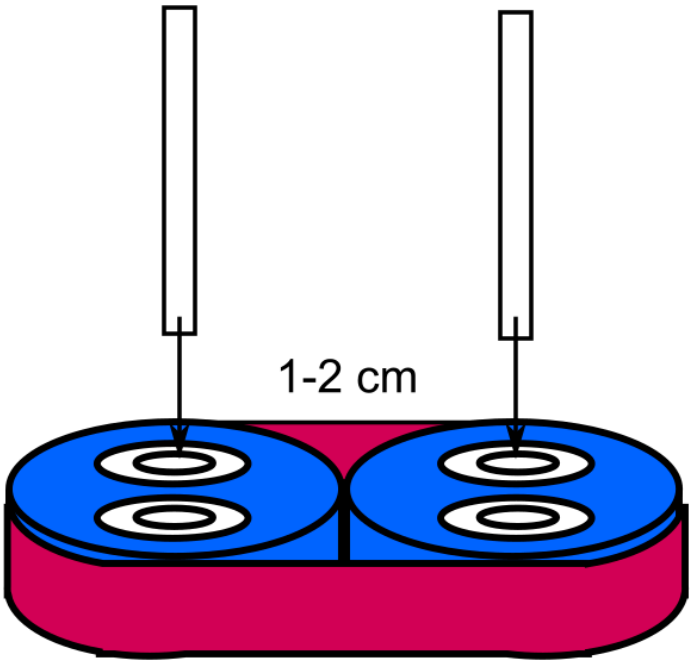
2. Add the cable grommets into the holes



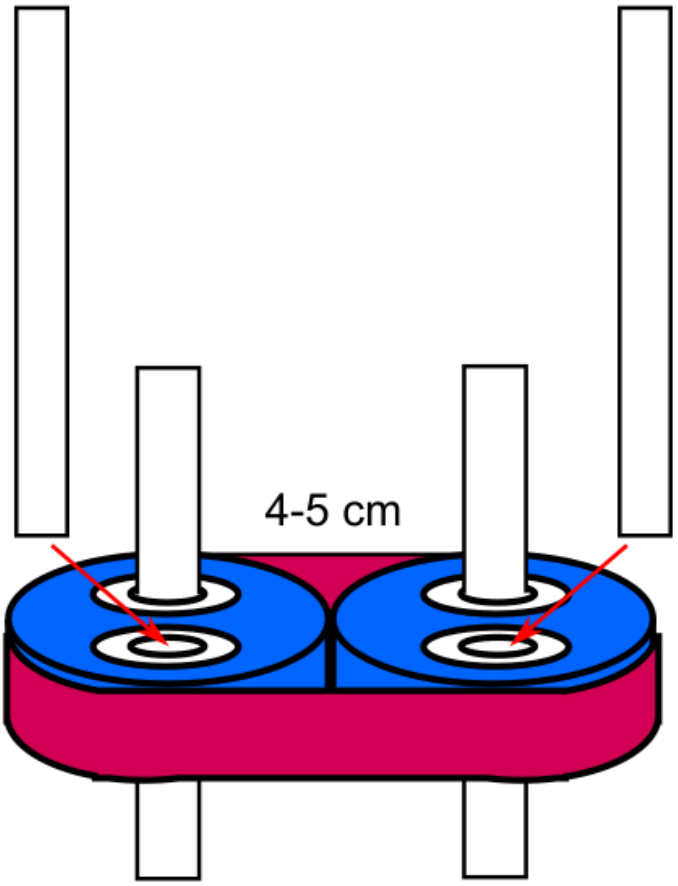
3. Use tape to fix the lids to each other



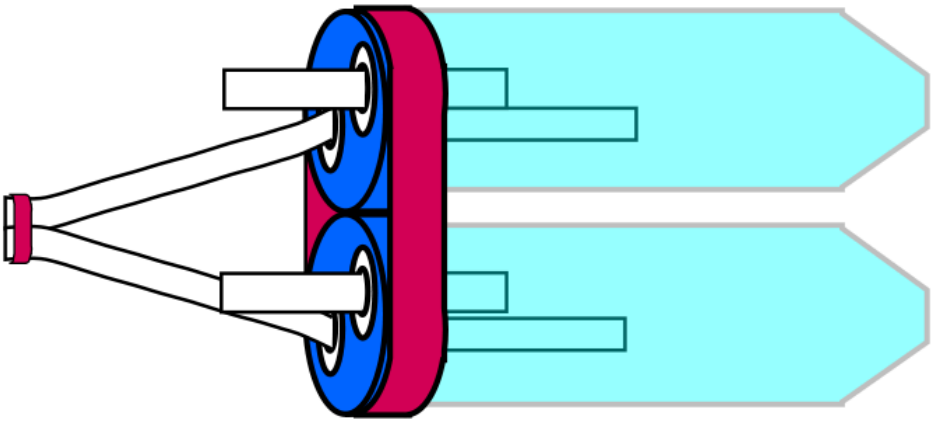
4. Add the two short stiff tubings into the upper to holes. They should only reach through the caps for 1-2 cm.



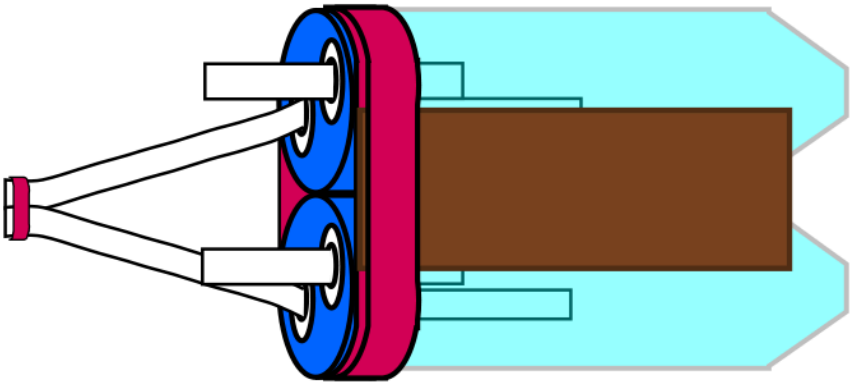
5. Add the long stiff tubes through the lower holes They should reach 4-5 cm through the cap.



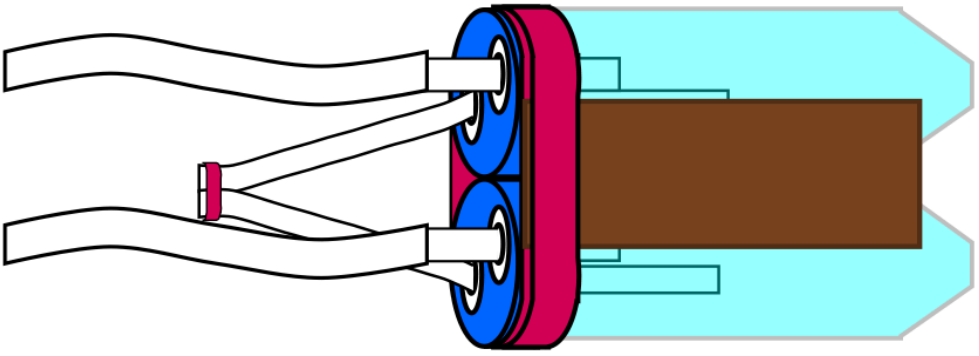
6. Tape the ends of the long tubing together and attach the Falcon tubes and flip over



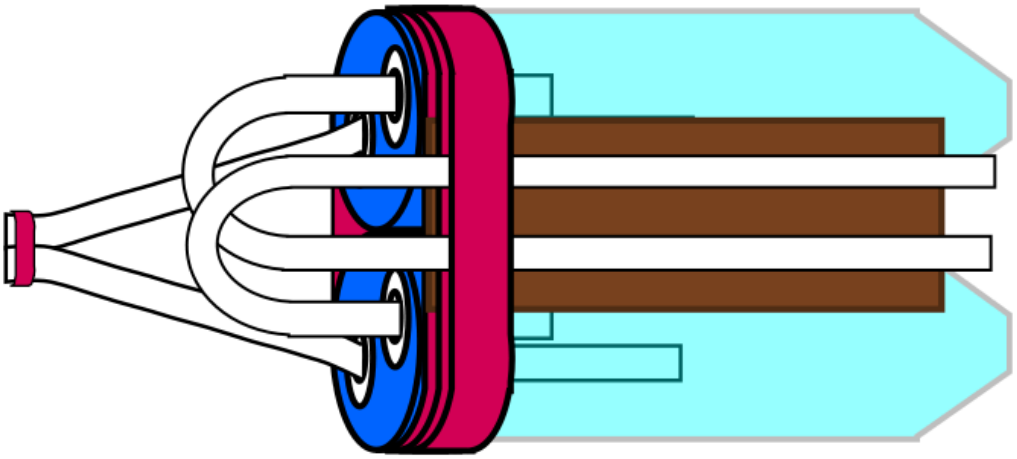
7. Tape the cardboard box piece as handle



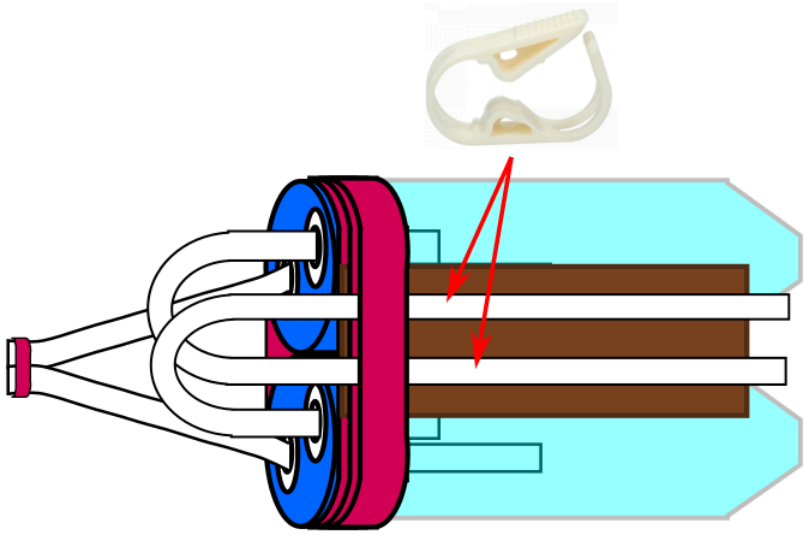
8. Attache the flexible tubing to the short stiff tubing



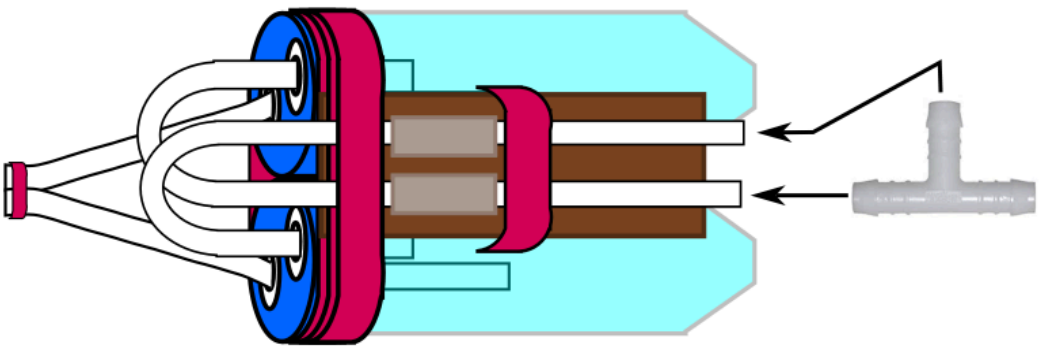
9. Fold the flexible tubing towards you, cross them once and tape them to the handle



10. Add the hose clamps and hold them in place with some more tape around the handle



11. Attach the T-piece to the loose tubing ends. (different configurations can be used. The shown one here is best for left-handed use. I use a brush in my right hand and the sorting device in my left when I sort flies).



12. Finally use th long flexible tube to connect the Device to a vacuum source

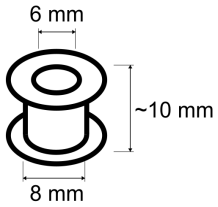
3D Printed Version (Falcons and Fly tubes)

If you have access to a 3D printer I have prepared a 3D printable handle that allows the attachment of Falcon Tubes and standard laboratory fly tubes (inner ø ~27 mm)

Material needed:

You can download the 3D printer file as .stl from the Bageritz Lab Github page:
https://github.com/BageritzLab/Fly-Sorter
I designed the handle in Sketchup Web so an additional .skp is provided.

- 4x silicone cable grommets (inner ø = 6 mm, outer ø = 9 mm)



- T-piece tube connector (ø 5 mm)

- 2x plastic hose clamp

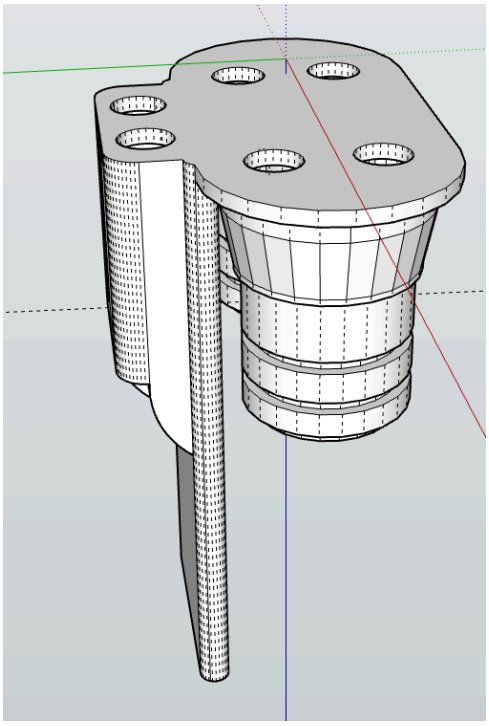
- 4x silicone sealing o-ring (inner ø = 23 mm, outer ø = 27 mm, 2 mm width)

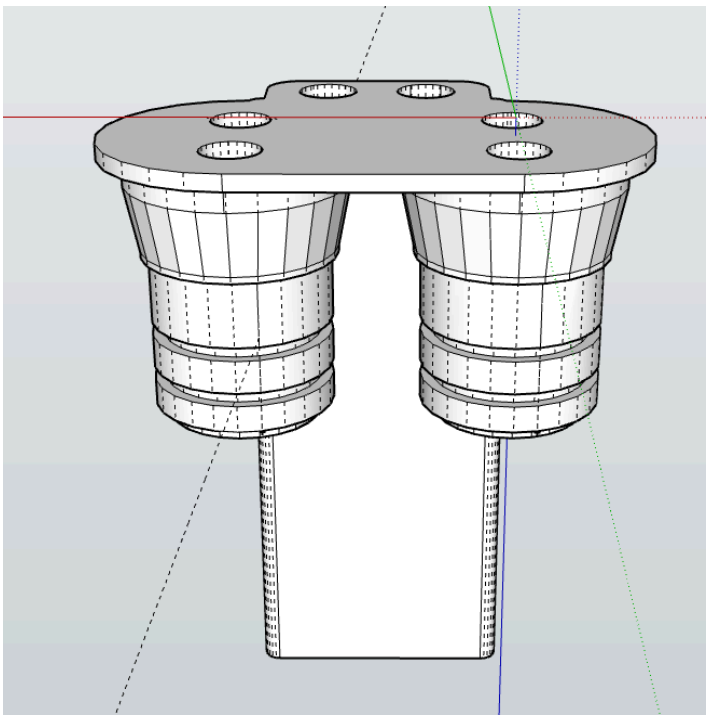
Tubing:

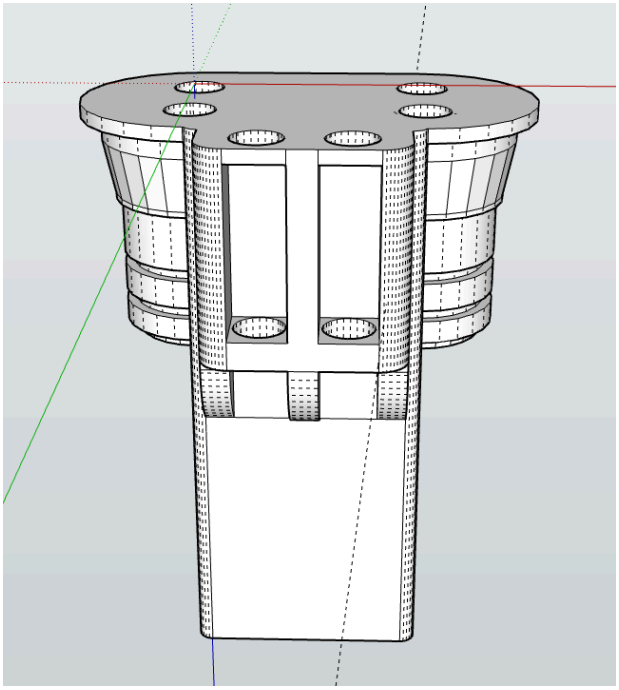
- Stiff tubing (inner ø = 4 mm, outer ø = 7 mm)
    - 2x ~7 cm
    - 2x ~20 cm
- Flexible Tubing (ø = 4 mm, outer ø = 7 mm)
    - 2x ~25 cm
    - A longer piece to connect to the vacuum

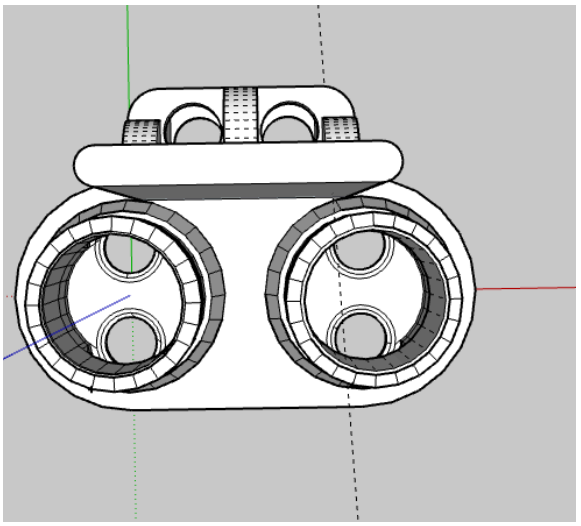
Build instructions:

The 3D printed handle looks like this:







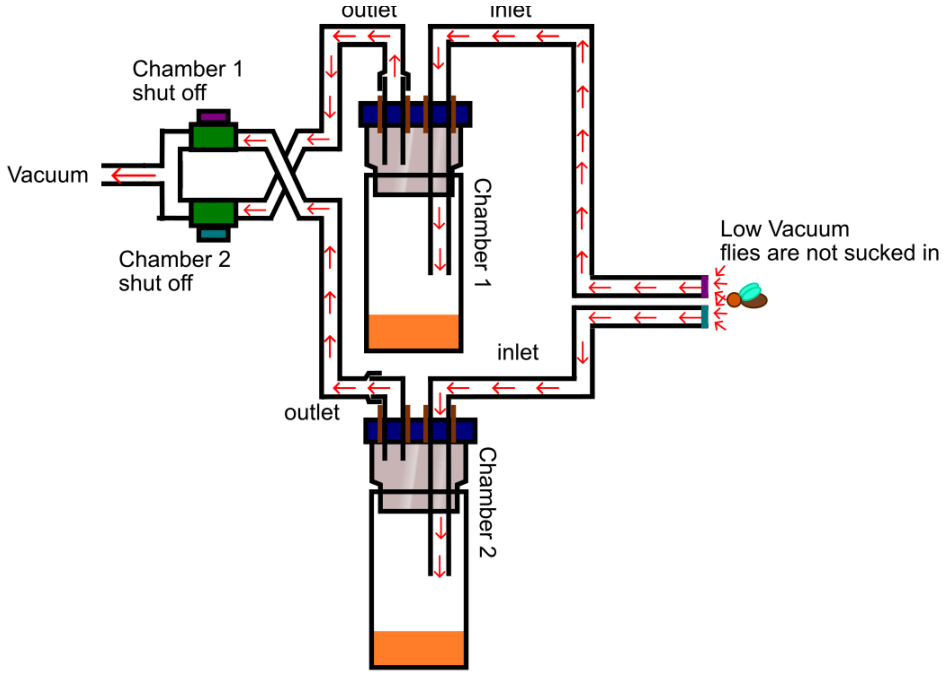


The building is very similar to the Quick build (Falcon only) you only need to add the sealing o-rings into the prepared groves of the Falcon/fly tube adapters.

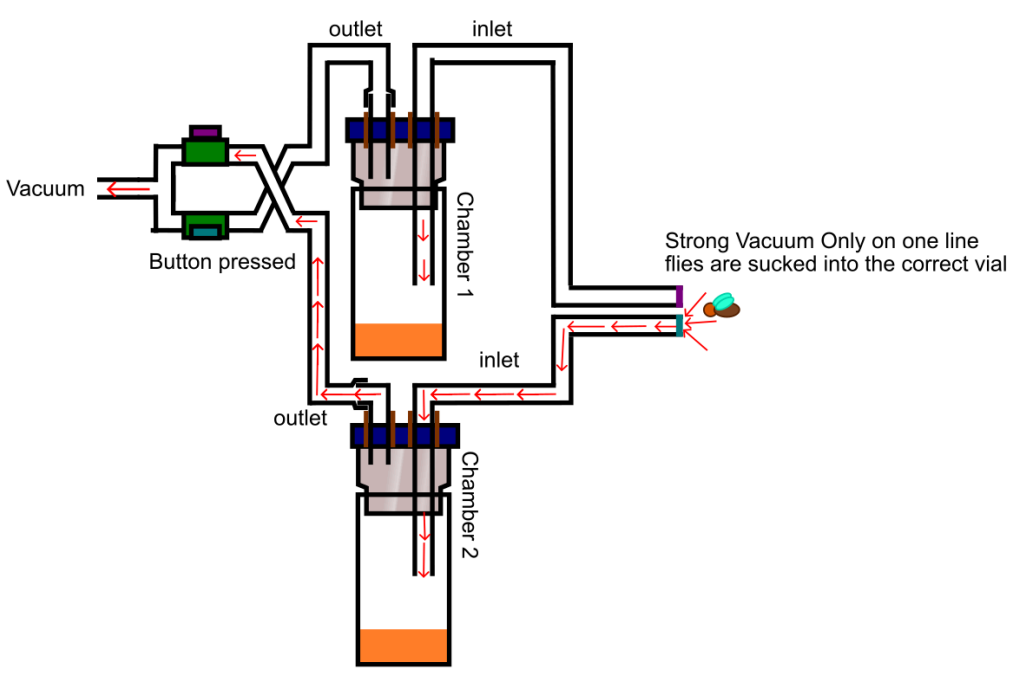
How to use the Fly Sorter

General Use:

1. Attach the Fly Sorter to a vacuum source.
2. **(Standby Mode)** Adjust the vacuum to the point that a fly that is placed directly in front of the entry is not sucked in but a fly that is already inside of the tubing gets sucked into the collection vial.
   (This is important to prevent sucking flies into the wrong vial by accident.)



3. **(Active Mode)** If you now press the right hose clamp the left collection tube gets shut off and the vacuum in the right collection tube increases to the point were a fly gets sucked into the collection vial and vice versa.



Sorting Flies in practice:

I put the flies onto a CO_2 pad to anesthezise them. Them I use a bush in the right hand to investigate the flies (decide if they are male of female). The Fly Sorter is held in Standby Mode in the left hand. When we have identified a fly I switch to active Mode by pressing the appropriate button and holding the entry point close to the fly so it is sucked up. This way the CO_2 time for the flies is minimized.

Alternatively, you can sort the flies into males and females and put them into distinct piles on the CO_2 pad. Then use the Fly Sorter in Active Mode to collect the whole pile.

Words of caution:

It is possible that eggs get stuck to the tubing and remain there until being dislodged by a following fly. Therefore , there is a risk of contamination. If you are using specific strains that you need to keep separate make sure to rinse the tubing with ethanol/water, and completely dry them.
Alternatively use a new fly sorting setup for each clonal line.