

L-VIS

ULTRA-LOW VOLUME IN-VITRO SLICE CHAMBER



USER MANUAL



POPNEURON
TOOLS FOR BRAINS

Welcome to the L-VIS Low-Volume In Vitro Slice Chamber—a breakthrough in electrophysiology that reimagines how we sustain and study live tissue.

For decades, researchers have accepted that in vitro slice experiments require bulky external reservoirs, lengthy tubing runs, and large volumes of artificial cerebrospinal fluid (ACSF). These conventional systems demand at least 10-15 mL or more of continuously circulated solution, making experiments with costly pharmacological agents prohibitively expensive. When compounds cost hundreds of dollars per milliliter, every experiment becomes a budgetary decision.



PopNeuron's L-VIS chamber changes this equation entirely.

The L-VIS is the first fully self-contained slice chamber system, operating with just 1.5-2 mL of total fluid volume—a reduction of over 80% compared to traditional systems. By integrating fluid circulation and oxygenation directly within

the chamber itself, the L-VIS eliminates external tubing, reservoirs, and the dead volumes they create. Your tissue receives the same continuous perfusion and oxygenation it needs to remain viable for hours, but the entire fluidic pathway exists within a compact, elegant enclosure.

This isn't simply miniaturization for its own sake. Smaller volumes mean:

- Dramatic cost savings when working with expensive agonists, antagonists, toxins, or custom compounds
- Reduced waste of both reagents and laboratory resources
- Simplified setup with fewer components to assemble, clean, and troubleshoot

The L-VIS maintains the performance characteristics researchers depend on—reliable oxygenation and healthy tissue throughout extended recording sessions—while fundamentally reducing the resource burden of slice electrophysiology.

Protected by patent, the L-VIS represents a new standard in in vitro slice recording: smarter, cleaner, and more economical. This manual will guide you through setup, operation, and maintenance of your chamber, helping you maximize both the scientific and economic value of every experiment.

Let's get started!

Kit Contents

Your L-VIS kit includes:

- Tin container with L-VIS slice chamber (if you purchased the 3-chamber set, the same container contains 3 slice chambers)
- Air humidifier bottle
- Box of cover glass slides
- Silicone caulk
- Bag with short (~2 inch) rigid orange tubing segments and all luer connectors
- 4 feet of flexible 1/16" clear tubing



Stuff breaks and gets lost over time but no worries. This kit includes extra connectors, pipe segments and cover glasses.



4



5

Assembly Instructions

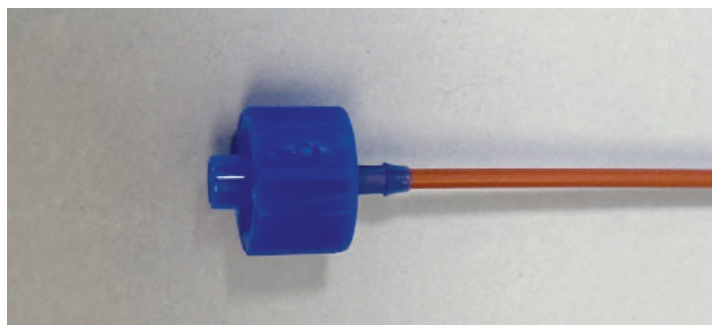
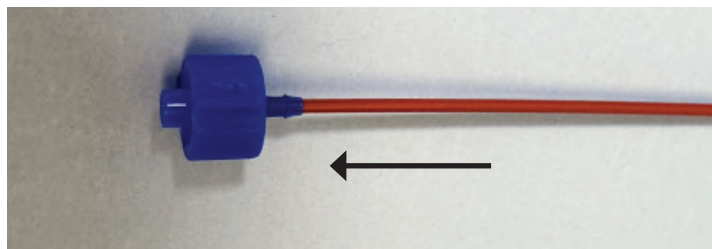
Step 1: Install the Cover Glass

Apply a thin, continuous layer of silicone caulk to the bottom of the slice chamber, ensuring complete coverage with no gaps to prevent fluid leakage. We recommend a toothpick or similar tool that allows you to apply small amounts. Once you applied the silicone, place a cover glass onto it and allow to cure for several hours.

Note: Spare cover glass slides are included. If a slide breaks during installation or later use, carefully remove all glass fragments with a razor blade holder—broken glass is extremely sharp—then clean the surface and install a new slide.

Step 2: Prepare the Orange Tubing Assembly

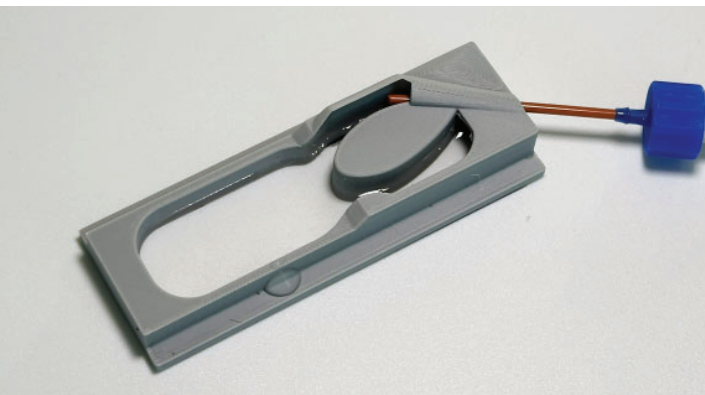
Take one piece of orange tubing and insert it through a small (1/16") male luer connector from the back side, pushing it completely through. To ease insertion, warm the luer connector in hot water for approximately 30 seconds. Seal with silicone caulk if needed.



Step 3: Install the Fluid Inlet

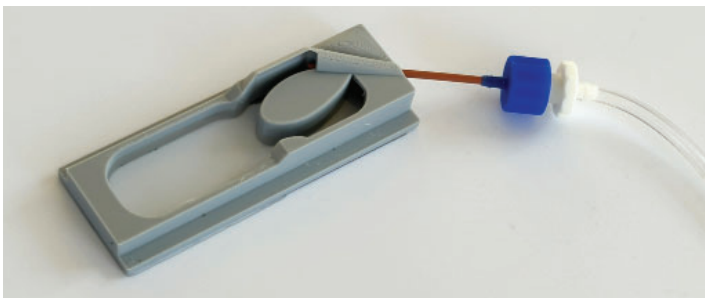
Insert the orange tubing assembly into the hole on the short side of the chamber (large image). When viewing the chamber from above, approximately 2mm of tubing should be visible protruding into the chamber interior (small image). Seal the entry point with caulk around the outside of the chamber.

You now have an inlet port: orange tubing inside the chamber, connected to a male luer fitting outside.



Step 4: Prepare the External Fluid Line

Attach a female 1/16" luer connector to one end of the 4-foot clear tubing and a male 1/16" connector to the other end.



Step 5: Connect the Humidifier and Complete Assembly

Attach the tube from the humidifier bottle's outlet port (the one on the side of the bottle), adding a female 1/4" luer to the free end of this tube. Connect the humidifier bottle to the 1/16" tubing assembly, and finally to the orange inlet port on the slice chamber. Connect the top outlet of the humidifier bottle to your gas supply (O₂, or gas mixture) with your own tubing. Fill the humidifier bottle with water.



Step 6: How the System Works

The L-VIS design addresses three critical requirements for stable, long-duration recordings:

Oxygenation and Circulation: The rigid orange tubing delivers gas at the precise angle needed to both oxygenate your ACSF and drive the L-VIS's signature figure-8 fluid circulation pattern throughout the chamber.



Vibration Isolation: The flexible 1/16" clear tubing creates mechanical isolation between your slice chamber and external gas supply. If you're recording on an air table (as most electrophysiology setups require), this prevents vibrations from your gas tank or regulators from reaching your preparation and degrading recording quality.

Humidity Control: Compressed gas from tanks is deliberately dehumidified during manufacture to prevent internal corrosion of the tank. This extremely dry gas would rapidly evaporate your ACSF—a serious problem when working with the L-VIS's small volumes (1.5-2 mL). Over a multi-hour experiment, evaporation would concentrate your solution and alter experimental conditions. The humidifier bottle saturates incoming gas with water vapor, maintaining stable ACSF volume throughout your recording session.

Your L-VIS is now fully assembled and ready for fluid filling and system testing.

Step 7: Setting Gas Pressure

You need surprisingly little pressure to operate the L-VIS effectively. If you see vigorous bubbling, splashing, or surface turbulence, your pressure is too high—and this vibration will degrade your recordings.

Adjust your regulator to just below the point where you observe splashing or vibration of the fluid surface. The goal is gentle, steady circulation with minimal surface disturbance. Start low and increase pressure gradually until you achieve smooth fluid movement without agitation.

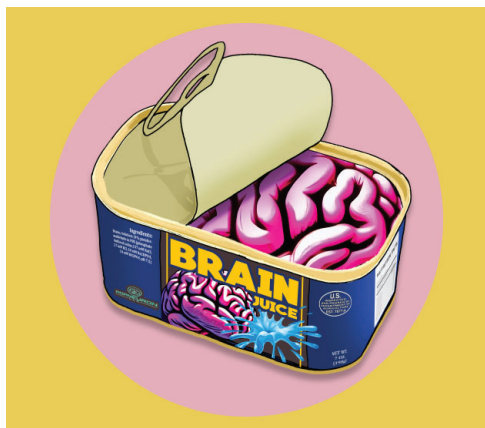
Happy Patching!

We want to hear from you!

We're excited to see the L-VIS contribute to your research. If you use the L-VIS chamber in your experiments, please mention it in your methods section and send us a copy of your published paper.

As a thank you, we'll send you \$50 PopNeuron store credit!

Your feedback and success stories help us continue improving tools for the neuroscience community.

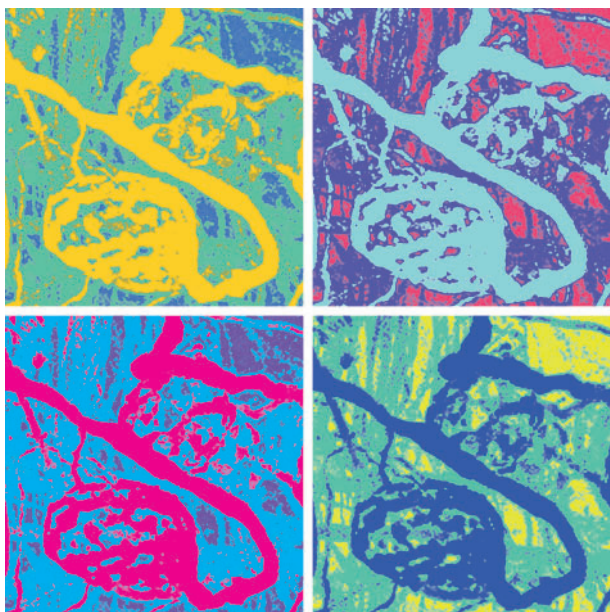


PopNeuron – By researchers, for researchers

Who is PopNeuron?

PopNeuron LLC is the beacon of innovation in the realm of neuroscience research. Our foundation is deeply rooted in research, enabling us to understand and cater to the nuanced demands of the scientific community. We are not just a tool provider; we are partners in pioneering discoveries, with our state-of-the-art equipment designed to usher in groundbreaking advancements in neuroscience. By uniquely amalgamating electrophysiology recording, optical and electrical neural stimulation techniques, neural signal processing, machine learning, digital and analog circuit design, microchip design, robotic automation, 3D computer vision, and computational modeling, we offer solutions unmatched in quality and precision. As we eye the future, our focus on areas like small animal robotic brain surgeries and neural signal processing underscores our commitment to staying ahead, ensuring that researchers are equipped with only the best tools available. At PopNeuron, we believe in shaping the future of neuroscience, one innovation at a time.





U.S. Patent

Number 9,458,420

System and methods for conducting
in-vitro experiments. 2016.

Methods Publication

Dondzillo et al.:

A recording chamber for small volume slice
electrophysiology.

Journal of Neurophysiology

114: 2053-2064, 2015.

PopNeuron LLC

3000 Lawrence Street

Denver, CO 80205

U.S.A.

www.popneuron.com

Made in the U.S.A.