



WORLD
PRECISION
INSTRUMENTS

Microinjection System



The equipment in the microinjection system above includes:

PZMTIII-MI microscope on LED Illuminated Base, **MICRO-ePUMP** Microinjector, **M3301** micromanipulator, mounted using and **M4C** Microscope Stage Adapter, **300744-EPUMP CAPILLARY KIT** with a μ Tip, and **14003-G** Vannas spring scissors. The **PRO-300 HDS** camera and screen may be added. Another option is the **NANOLITER2020** Nanoliter Injector with SMARTouch Controller (on the right), **M10** magnetic stand, and **5052** steel base plate (hidden). The Z-MOLDS Zebrafish Microinjection and Transfection Molds are shown in front of the Me microscope base.

Microinjection is a popular laboratory technique used for many applications, including cellular injection. WPI meets the need for lab budgets with efficient, cost-effective stations for microinjection and transfection.

Our injection systems have been serving scientist for over 30 years. In 2020 WPI introduced three new microinjection pressure injectors that cover a broad range of microinjection applications. Rapidly becoming one of our most popular pumps, the MICRO-ePUMP with Integrated Cell Penetrator and Internal Pressure Source is perfect for intracellular injection. The Cell Penetrator delivers a highly localized voltage signal to a targeted injection site to facilitate penetration with minimal trauma. The μ PUMP Microinjector with Internal Pressure Source works well with zebrafish and adherent cell microinjection. And, the PV850 Microinjector, which requires an external pressure source is a lower cost injector for many applications.

These three microinjectors use carefully regulated air pressure for injecting cells with fluid. The port supplies positive pressure for high-pressure ejection. The pressure port maintains a low positive “compensation” pressure to the injecting pipette between injection pulses to prevent fluid uptake through capillary action. The WPI Pressure Injectors are designed to inject very small quantities of fluids, such as drugs, into cells or small organelles. Pressure injection is an especially useful alternative to electroionophoresis, since it does not mandate the use of charged ions. You get repeatable microinjection in volumes ranging from picoliters to nanoliters.

Additionally, WPI offers a variety of accessories for microinjection like pumps, pullers, microscopes and more. WPI offers its customizable Microinjection System with everything you need to get started. Here you will find many options and accessories you may use to customize your system.



The system depicted on the cover and at left includes components often favored by researchers. Popular products are indicated with an * in the list below. Whatever your needs, WPI offers a range of equipment to fill your requirements.

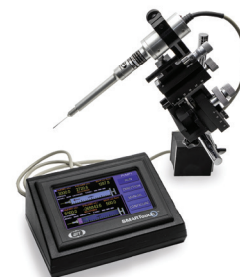
Options for Customizing Your System

INJECTORS FOR GLASS PIPETTES

- * **MICRO-ePUMP** Microinjector with Integrated Cell Penetrator and Internal Pressure Source
- **μPUMP** Microinjector with Internal Pressure Source
- **PV850** Microinjector with External Pressure Source (pressure source not included)
- * **NANOLITER2020** Nanoliter Injector with SMARTouch Controller



Designed to simplify intracellular injection and a variety of other microinjection tasks, WPI's **Microinjectors** use accurate timing and carefully regulated air pressures for securing cells and injecting. Injected volumes range from picoliters to nanoliters.

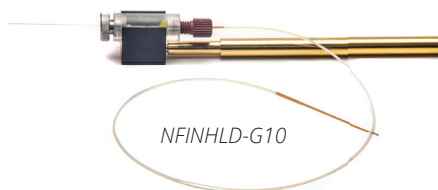


Microprocessor-controlled Nanoliter Injector **NANOLITER2020** with SMARTouch controller uses positive displacement injection, eliminating the need for pipette calibration. System uses glass micropipettes.

INJECTORS FOR GLASS PIPETTES OR METAL NEEDLES

The versatile UltraMicroPump **UMP3** injector is a Syringe-based micropump using metal needles as small as 36 gauge and microsyringes to deliver picoliter volumes.

A glass pipette injection kit is also available



Use with the NANOFIL syringe and 1mm OD glass for your microinjection application."

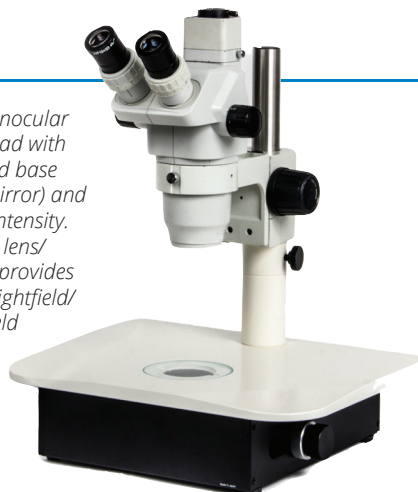
- **UMP3 with SMARTouch Controller** UltraMicroPump



MICROSCOPES

- * **PZMTIII-MI** Precision Stereo Zoom Trinocular Microscope
- **PZMIII** Precision Stereo Zoom Binocular Microscope
- **PZMIII-MI** Binocular Microscope Head with LED illuminated base (articulating mirror)

PZMTIII-MI Trinocular Microscope Head with LED illuminated base (articulating mirror) and variable light intensity. Dual reflection lens/mirror system provides transmitted brightfield/pseudo-darkfield illumination.



The Trinocular Microscope may be used with the **PRO-300 HDS**. See Accessories on Page 4.

NOTE: Microscope Base may be used with other manufacturer's microscope optics

PULLERS

- * **PUL-1000** Microprocessor-Controlled 4-Step Micropipette Puller
- **PMP-102** Programmable Multipipette Puller
- **SU-P97** Flaming/Brown Pipette Puller
- **SU-P1000** Next Generation Pipette Puller

WPI is an authorized distributor for Sutter Instruments

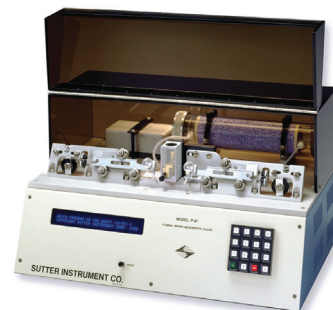
The **SU-P1000** micropipette puller was developed through years of experience with the Flaming/Brown style micropipette pullers and infused with leading edge technology.



PUL-1000 is a microprocessor controlled horizontal puller for making glass micropipettes or microelectrodes used in intracellular recording, microperfusion or microinjection. It offers programmable sequences of up to four steps with heating, force, movement and cooling time. Perfect for long taper pipettes.



The **SU-P97** Flaming/Brown type micropipette puller is ideal for fabricating micropipettes, patch pipettes and microinjection needles.



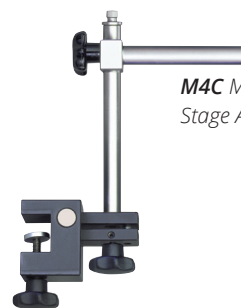
For more information, see www.wpiinc.com/microinjection

MANIPULATORS

- * **M3301** Manual Micromanipulator
- **KITE** Manual Micromanipulator
- * **M4C** Microscope Stage Adapter



Weighing just 550 grams, the **M3301** is a well-built German micromanipulator that outsells all others worldwide for high precision experiments where magnification is in the range of up to 250x.



M4C Microscope Stage Adapter

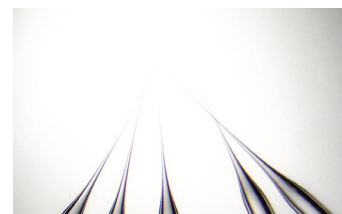
GLASS MICROPIPETTES

- * Glass Capillaries
- * Pre-Pulled Long Taper Glass Pipettes (**TIP15FLT**, **TIP12FLT**)

Get quality glass capillaries at superior prices for pulling your own microinjection pipettes or for making microelectrodes.

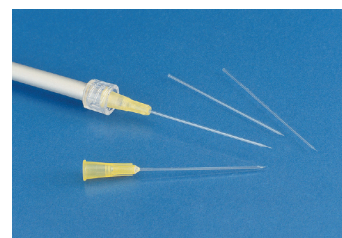


Eliminate the cost and trouble of pulling your own pipettes. Get new low cost, long taper pipettes with or without a filament. Taper length: 12-14 mm.



- * **MicroTip** Pre-Pulled Pipettes with Calibrated Tip ID

Calibrated Tip ID. Get pre-pulled, pipettes with or without a filament. Available in a variety of sizes. Luer connect option is available.



Microinjection System

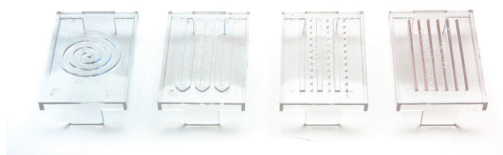
ACCESSORIES

- **PRO-300** HDS Camera and Monitoring Screen
- * **uPUMP** Capillary Kit
- * **ePUMP** Capillary Kit
- **Nanofil** Microliter Syringes - 10 or 100 μ L
- **NFINHLD-G10** - 1.0 mm Glass Pipette Holder for NANOFIL Syringe
- **MicroFil** for backfilling Glass Needles
- **Pipetters**
- * **E2XX** Micropipette Storage Jar
- **801566/801963** Vacuum Pump for use with the PV830
- **Fluorodish** Optical Glass Bottom Dishes
- **M10** or **M-3** Manipulator Base
- * **Z-MOLDS** Microinjection and Transplantation Molds
- Many Surgical Instruments

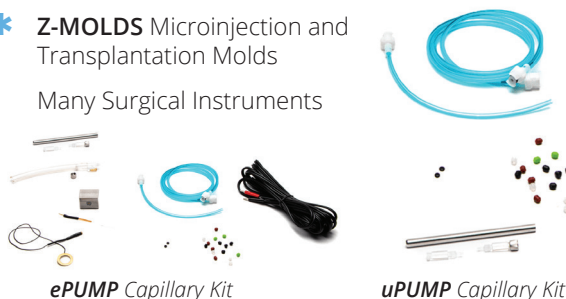
Use the **E2XX** jars to store up to 30 micropipettes, filled or unfilled, up to three inches in length.



MicroFil is a flexible and reusable glass needle as small as 36 gauge for backfilling micropipettes.



Z-MOLDS Microinjection and Transplantation Molds (4 per kit) are designed for zebrafish research. The molds are turned up-side down and placed in liquid agarose gel and are easily removed once it has solidified. Pipette the embryos into the grooves. The embryos self-align.



The new **PRO-300 HDS** is designed for high definition imaging for scientific and industrial applications. This full featured HD camera offers super fast frame rates in video preview, with unrivaled color fidelity and on-board image capturing capability. You can view and capture images and video directly to the supplied SD card without the need for a computer or separate monitor. The 11.6-in. HD display offers beautiful, crystal-clear image quality, and vibrant, true-to-life color with exceptional viewing from all angles.

ZEBRAFISH REFERENCES

Referenced in over 1567 peer reviewed publications

Video: Konantz, J., Antos, C. L. (2014). *Reverse Genetic Morpholino Approach Using Cardiac Ventricular Injection to Transfect Multiple Difficult-to-target Tissues in the Zebrafish Larva* : J. Vis. Exp. (88), e51595, doi:10.3791/51595. <http://www.jove.com/video/51595/reverse-genetic-morpholino-approach-using-cardiac-ventricular>.

Video: Kizil, C., Iltzsche, A., Kaslin, J., Brand, M. (2013). *Micromanipulation of Gene Expression in the Adult Zebrafish Brain Using Cerebroventricular Microinjection of Morpholino Oligonucleotides* : J. Vis. Exp. (75), e50415, doi:10.3791/50415. <http://www.jove.com/video/50415/micromanipulation-gene-expression-adult-zebrafish-brain-using>

Video: Holmes, K. E., Wyatt, M. J., Shen, Y., Thompson, D. A., Barald, K. F. (2011). *Direct Delivery of MIF Morpholinos Into the Zebrafish Otolarynx by Injection and Electroporation Affects Inner Ear Development* : J. Vis. Exp. (47), e2466, doi:10.3791/2466. <http://www.jove.com/video/2466/direct-delivery-mif-morpholinos-into-zebrafish-otocyst-injection>

Video: Cianciolo Cosentino, C., Roman, B. L., Drummond, I. A., Hukriede, N. A. (2010). *Intravenous Microinjections of Zebrafish Larvae to Study Acute Kidney Injury* : J. Vis. Exp. (42), e2079, doi:10.3791/2079. <http://www.jove.com/video/2079/intravenous-microinjections-zebrafish-larvae-to-study-acute-kidney>

Video: Russek-Blum, N., Nabel-Rosen, H., Levkowitz, G. (2010). *Two-Photon-Based Photoactivation in Live Zebrafish Embryos*. J. Vis. Exp. (46), e1902, doi:10.3791/1902.

Video: Kague, E., Weber, C., Fisher, S. (2010). *Mosaic Zebrafish Transgenesis for Evaluating Enhancer Sequences* : J. Vis. Exp. (41), e1722, doi:10.3791/1722. <http://www.jove.com/video/1902/two-photon-based-photoactivation-in-live-zebrafish-embryos>

Yabing Li, Zhihua Han, Xinmei Zheng, Zhiyuan Ma, Hongling Liu, John P. Giesy, Yuwei Xie, Hongxia Yu. (2014). *Comparison of waterborne and in ovo nano-injection exposures to assess effects of PFOS on zebrafish embryos* : Environ Sci Pollut Res. DOI: 10.1007/s11356-014-3527-y. <http://www.usask.ca/toxicology/jgiesy/pdf/publications/JA-799-temp.pdf>

Katarina Vajn, Denis Suler, Jeffery A. Plunkett, Martin Oudega. (2014). *Temporal Profile of Endogenous Anatomical Repair and Functional Recovery following Spinal Cord Injury in Adult Zebrafish* : Published: August 26, 2014 DOI: 10.1371/journal.pone.0105857. <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0105857>

Henson HE, Parupalli C, Ju B, Taylor MR. (2014). *Functional and genetic analysis of choroid plexus development in zebrafish* : Frontiers in Neuroscience, v.8, 364, doi:10.3389/fnins.2014.00364. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4226144>.

Wagley S, Hemsley C, Thomas R, et al. (2014). *The twin arginine translocation system is essential for aerobic growth and full virulence of Burkholderia thailandensis* : J Bacteriol. 2014;196(2):407-416. doi:10.1128/JB.01046-13. <http://jba.asm.org/content/196/2/407.full>

Perathoner S, Daane JM, Henrion U, et al. (2014). *Bioelectric signaling regulates size in zebrafish fins* : PLoS Genet. 2014;10(1):e1004080. doi:10.1371/journal.pgen.1004080. <http://journals.plos.org/plosgenetics/article?id=10.1371/journal.pgen.1004080>

Jo DH, Son D, Na Y, et al. (2013). *Orthotopic transplantation of retinoblastoma cells into vitreous cavity of zebrafish for screening of anticancer drugs*. Mol Cancer. 2013;12:71. doi:10.1186/1476-4598-12-71. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3707771/>

Nakaya N, Sultana A, Lee H-S, Tomarev SI. (Oct. 26, 2012) *Olfactomedin 1 interacts with the Nogo A receptor complex to regulate axon growth*. J Biol Chem. 2012;287(44):37171-37184. doi:10.1074/jbc.M112.389916. <http://www.jbc.org/content/287/44/37171.full>

Seo J, Yun C-O, Kwon O-J, et al. (2012). *A proteoliposome containing apolipoprotein A-I mutant (V156K) enhances rapid tumor regression activity of human origin oncolytic adenovirus in tumor-bearing zebrafish and mice* : Mol Cells. 2012;34(2):143-148. doi:10.1007/s10059-012-2291-4. <http://dx.doi.org/10.1007/s10059-012-2291-4>

Other references available at www.wpiinc.com/picopump

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