multichannel **✳**
systems

# rob✳inject

Automated Injection in *Xenopus* Oocytes
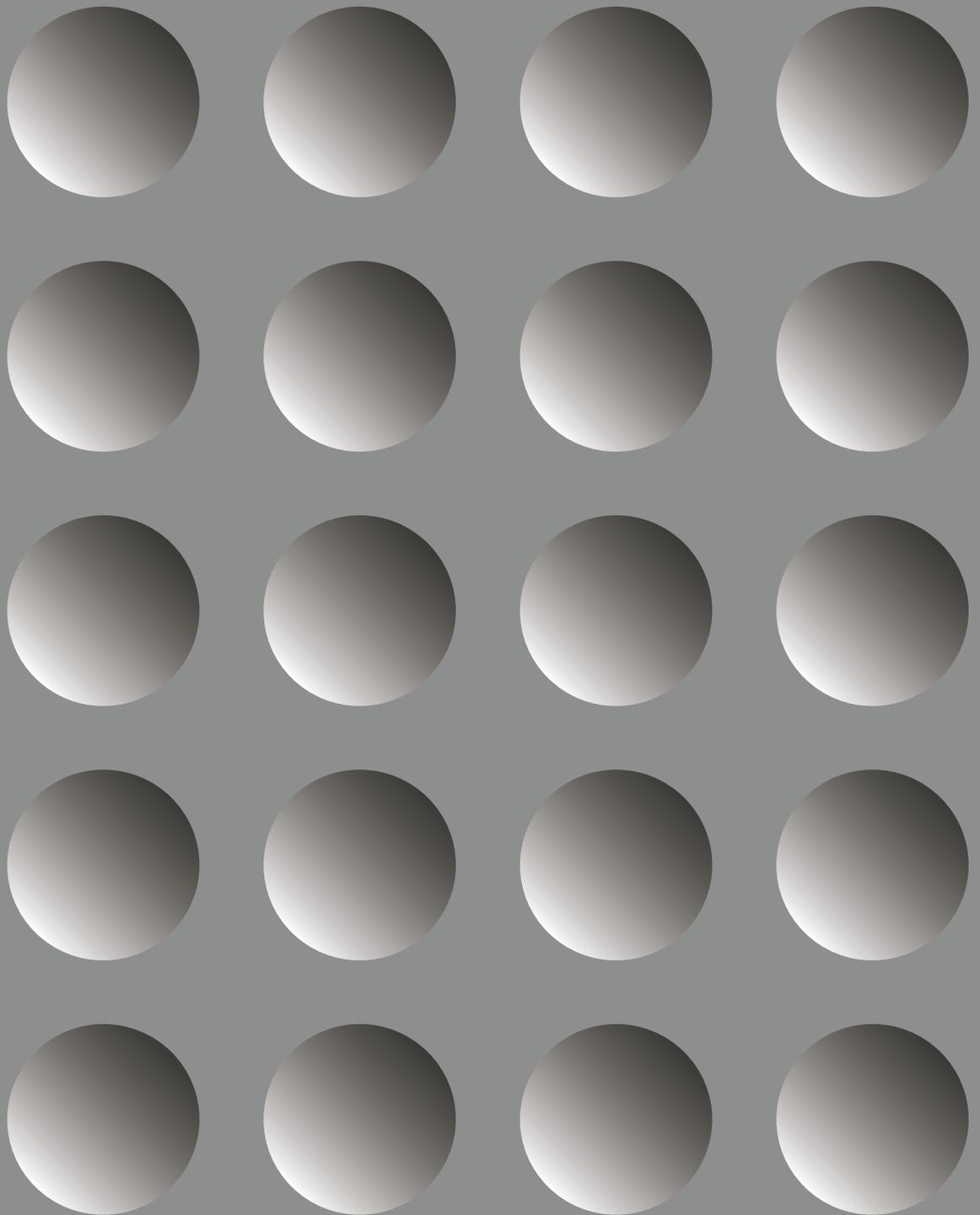
Injection goes automatic

Numerous scientific fields such as biochemistry, molecular biology, electrophysiology, pharmacology or developmental biology take advantage of injecting cDNA, mRNA, proteins, and a variety of other compounds into living cells.

Oocytes of the African clawed toad *Xenopus laevis* are widely used as an expression system for ion channels, receptors, and transporters in drug development. The injection of fertilized eggs or embryos of the zebra fish *Danio rerio* is a common technique in developmental biology.

Until now, injection of nanoliter volumes into cells or embryos has been time-consuming and highly qualified personnel was required in order to get reasonable and reproducible results.

Multi Channel Systems is proud to present the Roboinject, the first and only commercially available fully automated robot for compound injection into oocytes, eggs, and embryos using industry standard 96, 384, as well as custom well plates.

The automation of cell injection not only saves time and money but also greatly enhances reproducibility of injection and survival of cells. It allows your highly qualified personnel to do away with routine work and to concentrate on science.

Furthermore, Xenopus oocytes processed in 96-well plates by the Roboinject can be further analyzed with the Roboocyte, our fully automated system for high-throughput, two-electrode voltage-clamp based secondary screenings.


The Roboinject's compact and functional design saves space on your work bench. It is compatible with standard lab equipment and can be easily integrated in your working environment. The Roboinject is straight forward and easy to operate; handling does not require special skills or any additional special equipment. Software controls for all parameters replace any knobs on the device.

The Roboinject can be operated with disposable industry standard 96 or 384 well plates, but can also be easily adapted to custom well plates. The Roboinject package includes everything you need to start right away, including prepulled injection needles, a set of well plates, and a stereo microscope.

- Sequential injection of oocytes, eggs or embryos without user intervention
- Easy handling - no special skills or equipment required
- Maintenance-free system
- Full compatibility with the Roboocyte® when using 96-well plates

Carrier

The well plate carrier, powered by linear motors, hovers smoothly and noise-free on a cushion of pressurized air above a magnetic steel plate and operates at 20 μm resolution. The well plate carrier can hold up to eight industry standard 0.5 ml reaction tubes serving as sample reservoirs. The complete system does not require maintenance other than occasional cleaning of the steel plate.
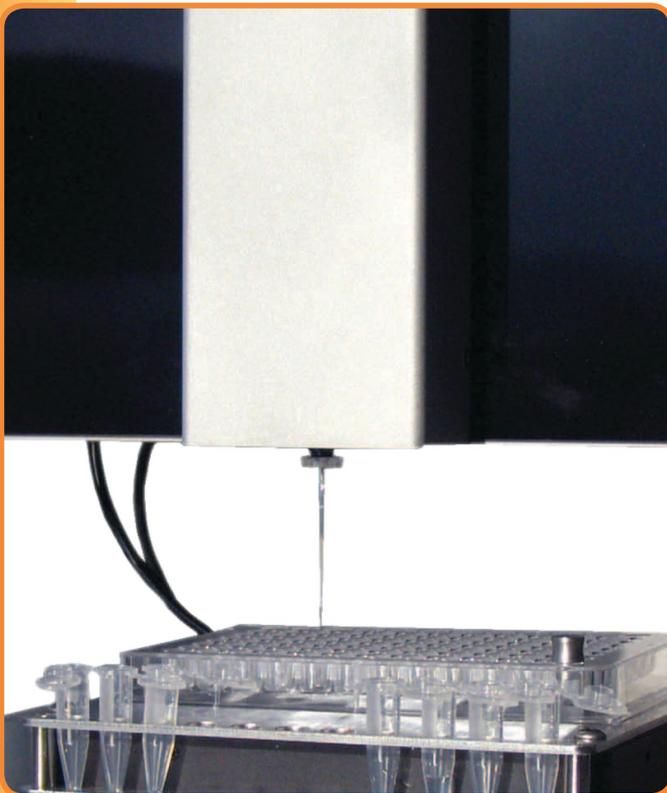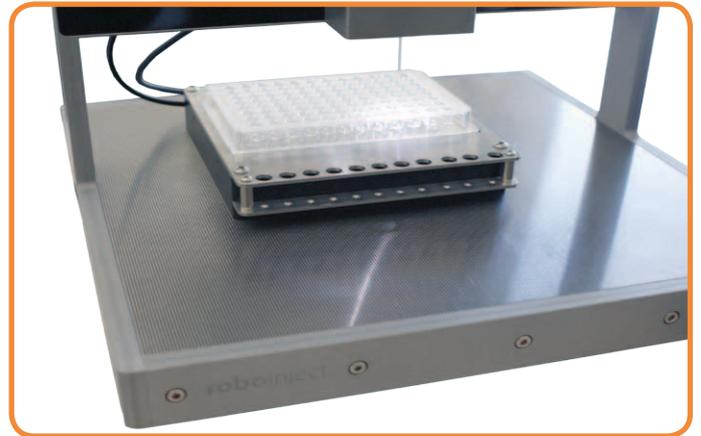
Z-axis and injector

The vertical z-arm holding the injector-unit moves at a resolution of <20 μm and is designed specifically for the high demand of stability, speed, and precision. A single and quickly performed, software-controlled alignment procedure guarantees that all cells are injected precisely.

The injection itself is accomplished by the well-approved displacement method. This makes tedious and time-consuming volume calibrations dispensable. This is obligatory when working with pressure-driven systems.

Prepulled, ready-to-use borosilicate glass micro-pipettes can be provided by us, but custom injection needles may also be used. Mounting of injection capillaries is extremely fast and simple by using Luer fittings. There are no additional gaskets susceptible to leakage rendering the injection device durable and maintenance-free.

- Extremely simple and stable mounting of injection capillaries
- Variable injection and sample uptake speed
- Variable injection depth
- Automated cell wash or exchange of cell culture medium
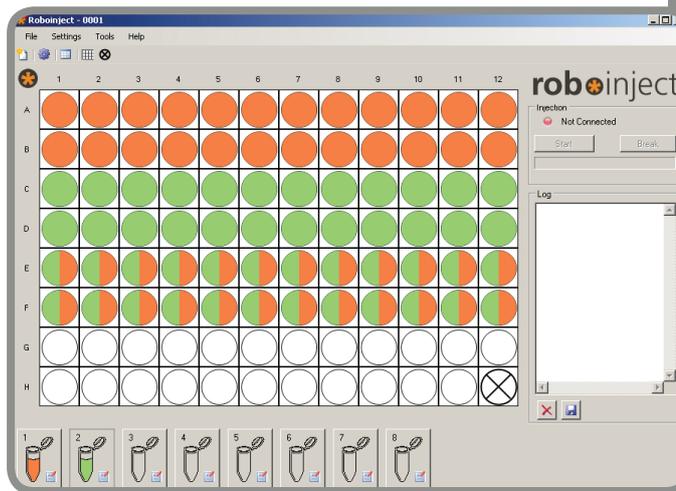
Easy to use

Injections with the Roboinject are performed automatically and under full computer control. The easy-to-use graphical user interface makes daily work with the Roboinject quick and easy. After defining the injection samples, you attribute these together with injection depth and volume to the respective cells on the virtual well plate. The corresponding colors will always keep you informed about your selection. The left picture shows the injection with two different samples in rows A to D and the co-injection of both in rows E and F.

Full documentation

You define all parameters such as total number of samples, sample names and concentration, injection volume, injection speed, injection depth, and attribute these to the respective cells with a few mouse-clicks. The system then automatically calculates the needed sample volumes.

Roboocyte users can reload the well-plate for subsequent TEVC analysis as usual. You can also print-out a report sheet which contains all information.
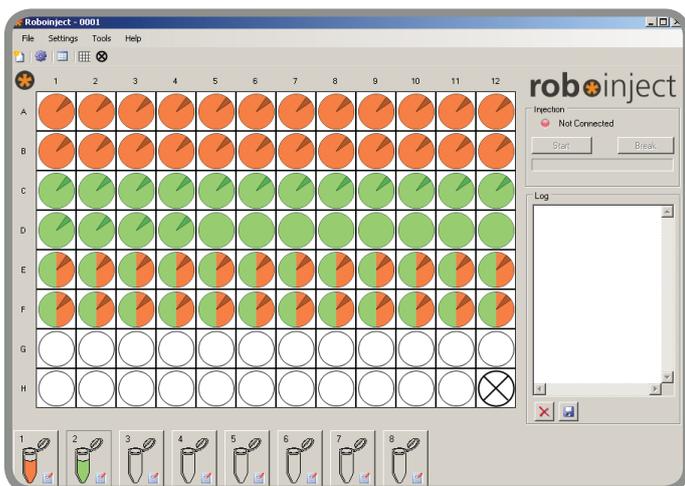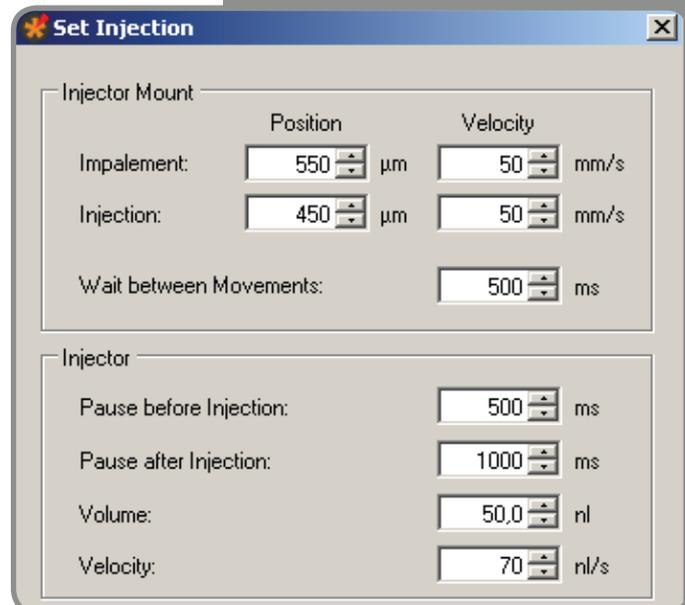
Full automation

After mounting the oil-filled injection capillary, and after passing the quick and easy tip-alignment procedure, you start the injection run by a single mouse click. The Roboinject software controls the run for the whole well plate, even including sample uptake and wash cycles to avoid cross-contamination between different samples. From start to completion of the injection run, no user invention is needed anymore. The progress of injections is symbolized in real-time on the virtual well-plate for every single sample and cell. See on the left, sample 1 (red) is already injected completely, injection of sample 2 (green) is in progress in row C to F (marked by dark tapered symbols).

- Inject up to 4 different samples per oocyte and up to 8 different samples per plate
- Injection volume adjustable from 1 to 100 nl in 0.5 nl steps
- Automated sample uptake from industry standard 0.5 ml reaction tubes
- Automated needle rinsing before uptake of new samples
- Full documentation of all injection parameters

Technical Data

Roboinject Robot

Dimensions	320 mm x 320 mm x 310 mm (WxDxH)
Weight	23 kg
Supply voltage	115 VAC Normal: 90 VAC to 132 VAC @ 60+/-3 Hz
	230 VAC Normal: 180 VAC to 264 VAC @ 50+/-3 Hz

Performance

Usable well plates	disposable standard 96, 384 (custom well plates on request)
x/y Movement speed	80 mm/s
z-axis speed	40 mm/s
Average time needed for 96 injections	8 min
Positioning accuracy	20 µm in X/Y and Z dimension
Injection volume	1-100 nl in 0.5 nl steps

Software

Connection to the Computer	USB 2.0
Operating system	Windows XP, Windows Vista, Windows 7

Full automation and control of all injector functions

Fully graphical user interface

Full compatibility with the Roboocyte2 when using 96 well plates

Accessories

Stereo microscope

Pre-pulled injection micropipettes

Replacement plungers

Mineral oil

96-well plates

multichannel *
systems

Innovations in Electrophysiology

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