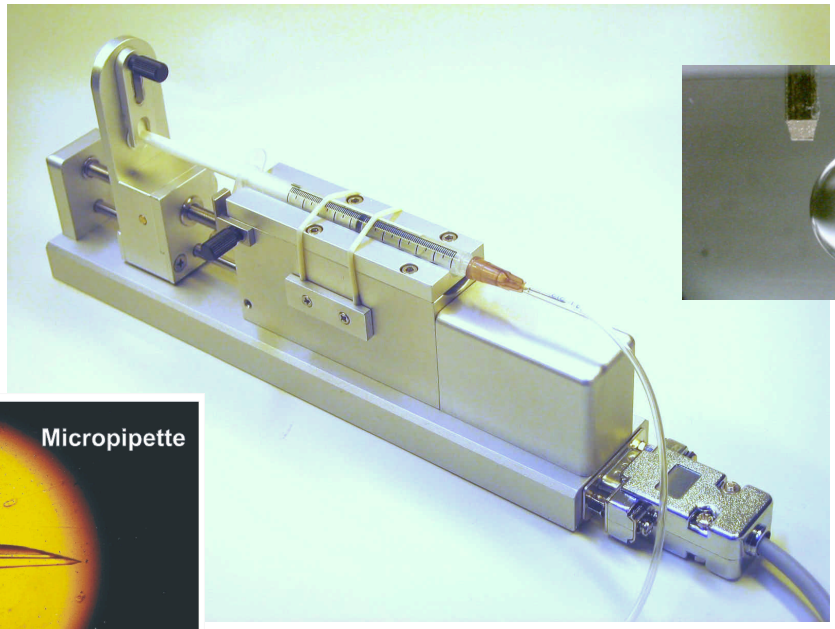
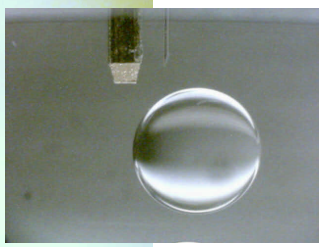
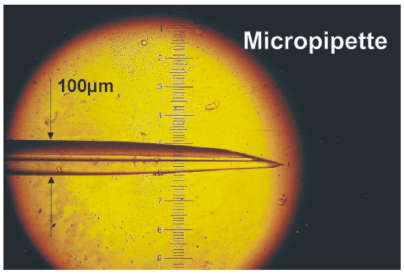
Thomas RECORDING GmbH

Scientific Resources

Microinjection System







Thomas RECORDING introduces a newly developed **microinjection system** for neurophysiological applications. The uniqueness of the microinjection system **MIS-02** in comparison to other microinjection systems presently available on the market is, that it is adapted to the Thomas RECORDING multielectrode drives. The complete recording/injection system is software controlled and very precise. With the microdrive system it is possible to place microinjection pipettes with microelectrodes very close together and simultaneously in the brain. The system is useful for delivering drugs and chemicals directly to the vicinity of target neurons. So the system can help to provide important information about the identity and functional characteristics of neurotransmitters and neuromodulators.

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Microinjection System

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Pressure microinjection with syringe pump systems is used to deliver uncharged or poorly charged substances to the

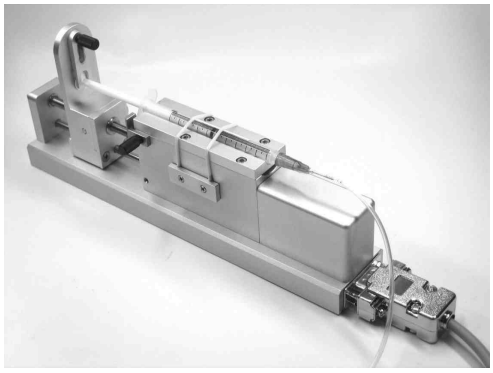

Figure 1: Microinjection system syringe pump with loaded syringe and connected special thick wall tube

vicinity of neurons. The technique is useful for both in vivo and in vitro studies. Pressure microinjection must provide an accuracy and reproducibility in delivery of the fluid in a wide range of volumes and minimal tissue damage within the injection site. An optimal microinjection system for neurophysiological applications should consist of thin glass micropipettes with a relatively small tip diameter that can be placed very closely within an array of multiple recording microelectrodes. This requires the integration of the injection system in a multichannel recording system. Much effort has being dedicated by Thomas RECORDING to develop a microfluidic system for pressure injection of neuroactive substances through thin quartz glass micropipettes. In this manual Thomas RECORDING introduces a novel microinjector based on digital drive and control that extends TREC´s multielectrode recording systems by the possibility of precise microinjection. Performance and characteristics such as large driving force, precise micro liquid volume controllability, deep brain injection and easy software based control of the injection pump parameters are described in this manual.

Hydraulic pressure generated by a syringe micropump is used to eject the fluid from a quartz glass micropipette made by Thomas RECORDING.

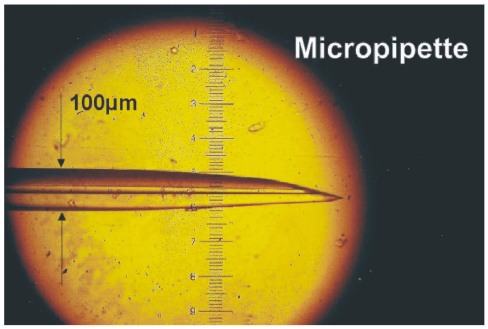

Figure 2: Ligth microscope photo of a quartzglass microinjection pipette tip

The quartz glass micropipettes as well as the quartz-platinum/tungsten microelectrodes are delivered to be loaded to Thomas RECORDING´s multielectrode systems. This means that the micropipettes are equipped with the same patented rubber tube driving mechanism as the microelectrodes for the TREC multielectrode recording systems.

Microinjection System

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Thomas RECORDING is the only company worldwide offering the possibility to place closely spaced microelectrodes together with microinjection pipettes in different depths of the brain with high and reproducible positioning accuracy. If the pipettes are placed with the microdrive system, a syringe pump system is used to inject the fluid from a quartz glass micropipette. A hydraulic pump system is preferable because it does not require an air pressure delivery system and allows direct measurement of ejected volumes via the graphical user interface of the syringe pump control software (see figure 3). With the use of this software the researcher is able to control up to 16

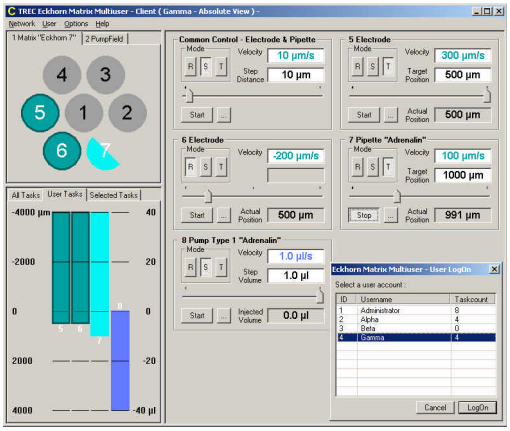

Figure 3: Graphical user interface (gui) of the motor control software that allows to control the position of microelectrodes and micro-injection pipettes as well as the pump parameters for drug injection.

microelectrodes and/or injection pipettes simultaneously. Drug injection through one or more micropipettes and simultaneous recording from multiple microelectrodes in the near environment of the injection pipettes is only possible with the Thomas RECORDING multielectrode systems “Mini Matrix” or “Eckhorn System”.

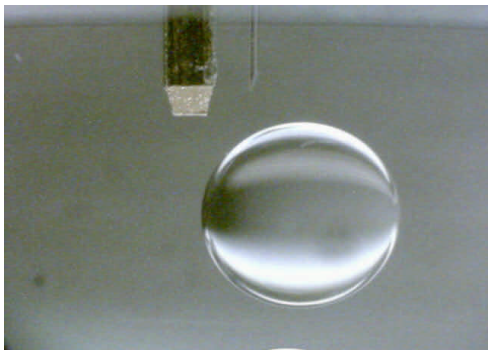

Figure 4: Drop of water injected with the pump system via a quartzglass pipette. The pipette tip is visible above the drop. On the left side, beside the piptte tip, one can see a piece of metal with an outer diamter of 640µm.

The microinjection system is available also for scientists that do not use a Thomas RECORDING microdrive system. Please do not hesitate to contact us for further information:

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