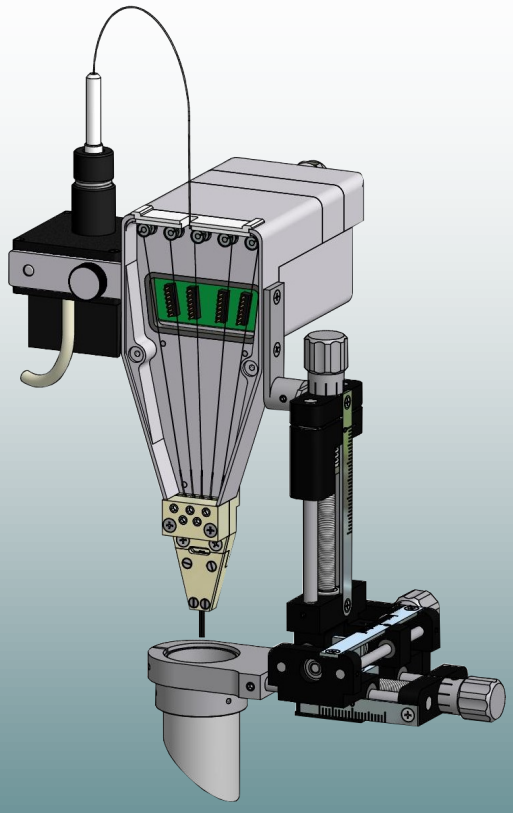
32 Channel Thomas Mini Matrix©

- 32 Recording/Stimulation Channels
- Microinjection or optical Stimulation
- Data Acquisition System integrated
- For NHP and rodents
- 3D-Macro- and Micronavigation
- 3D-Reconstruction of neural Network (coming soon)
- Autonomous Electrode Positioning (coming soon)



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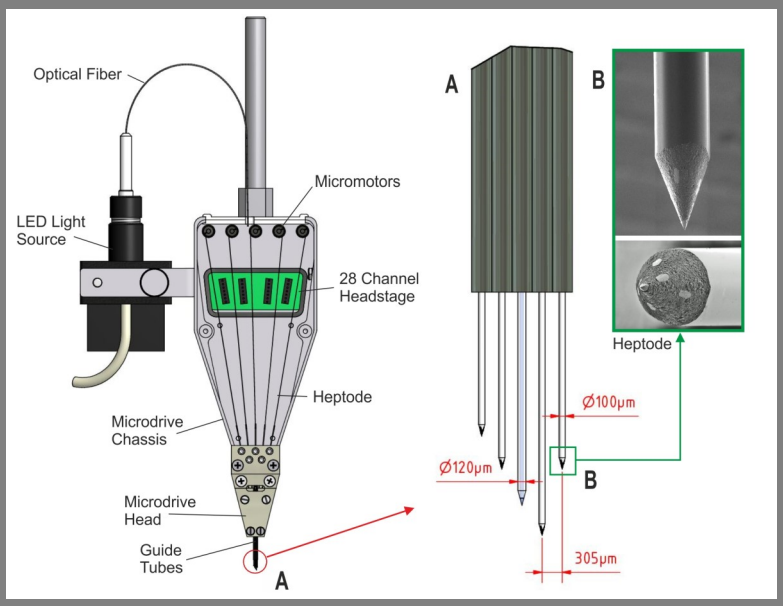
Thomas Mini Matrix©

Versatile Microdrive Systems

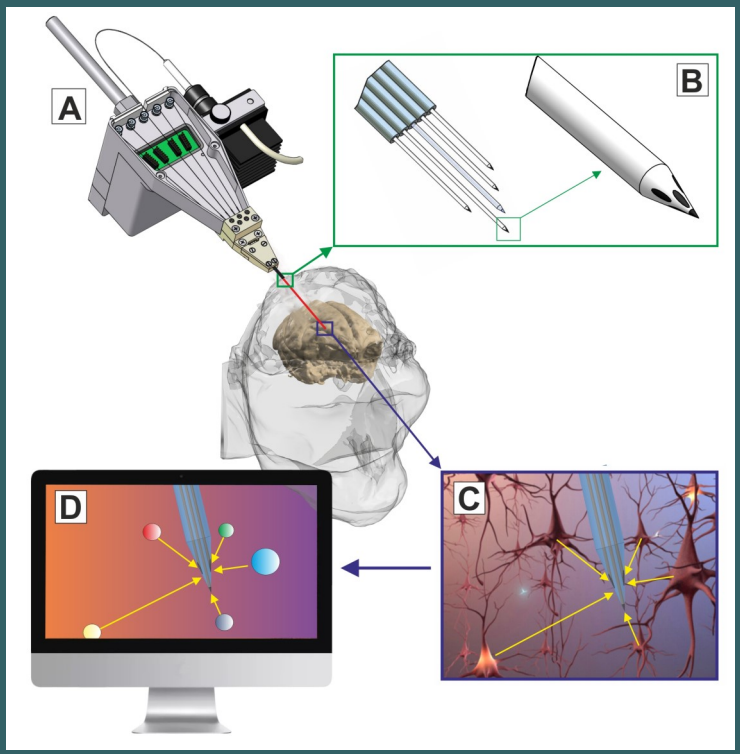
Made in GERMANY



The new Thomas Mini Matrix is a microdrive system using the **patented Thomas rubber tube drive** to move up to 4 **heptodes** (7 channel fiber microelectrode, outer diameter 100µm) and 1 **tetrode** independently from each other to different depths of the brain. With a travel distance of up to 24-30 mm (larger travel distances on request) this allows **cortical as well as deep brain recordings**. Beside the heptodes one can load an additional injection pipette, an optical fiber or an electrical stimulation electrode and move it like the heptodes, computer controlled into the brain target under investigation. The axial resolution is 1µm which allows a precise micronagivation through the target. Macronavigation is done by an additional feature of the Thomas Mini Matrix: an optional available **3D-neuronavigation software (CortExplore)**. This 3D-neuronavigation software transfers individual animal´s images, yielded by pre-experimental CT or MRI scans, onto the experimental field to assist the neuroscientist intraexperimentally in defining entry points and trajectories for the recording electrodes and identifying the exact position of the brain target area of interest. The exact position of each recording electrode in the brain is continuously transmitted from Mini Matrix motor control unit to the navigation system and displayed on the navigation system screen (see page 4 of this brochure).

Beside the aforementioned specifications there are two additional features currently under development at Thomas RECORDING which will be optional availalbe soon.

An **autonomous electrode positioning** algorithm will allow to place the recording electrodes automatically and readjusts the recording position if required. Based on the recorded neural signals from the close environment of the recording heptode tip (B) we plan to **reconstruct the network of active neurons** on the computer screen (C-D). Imagine being able to inject a drug using the Thomas Mini Matrix (A) and to view the reaction of the neural network directly on the computer screen (D).



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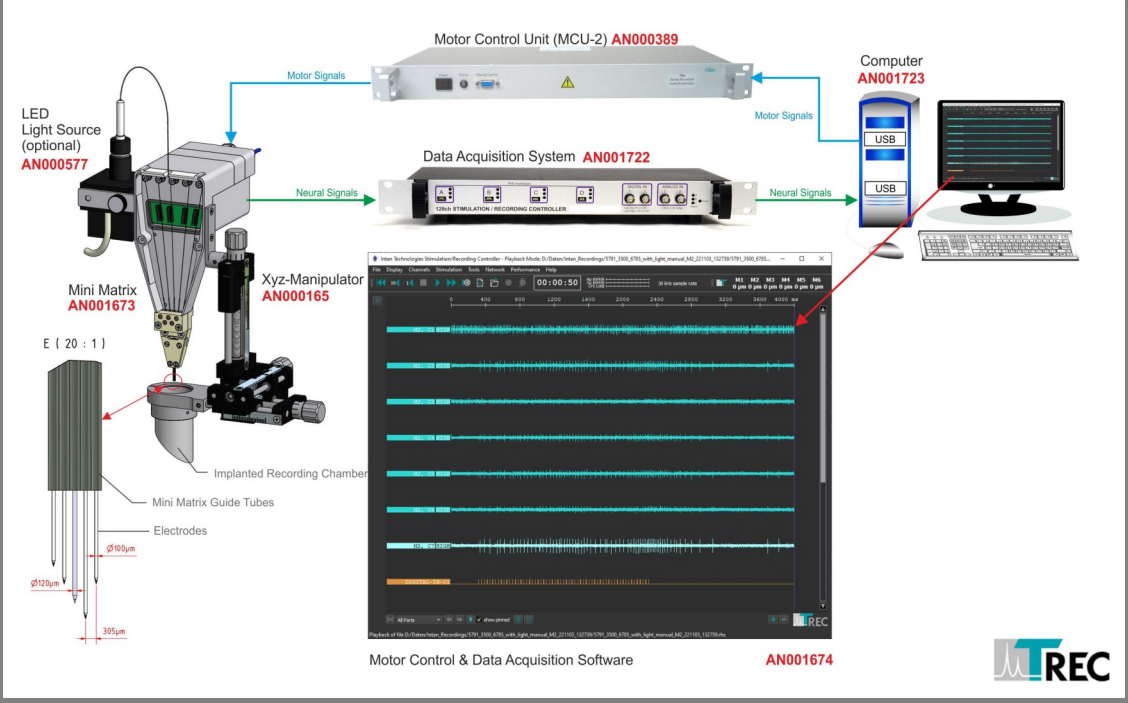
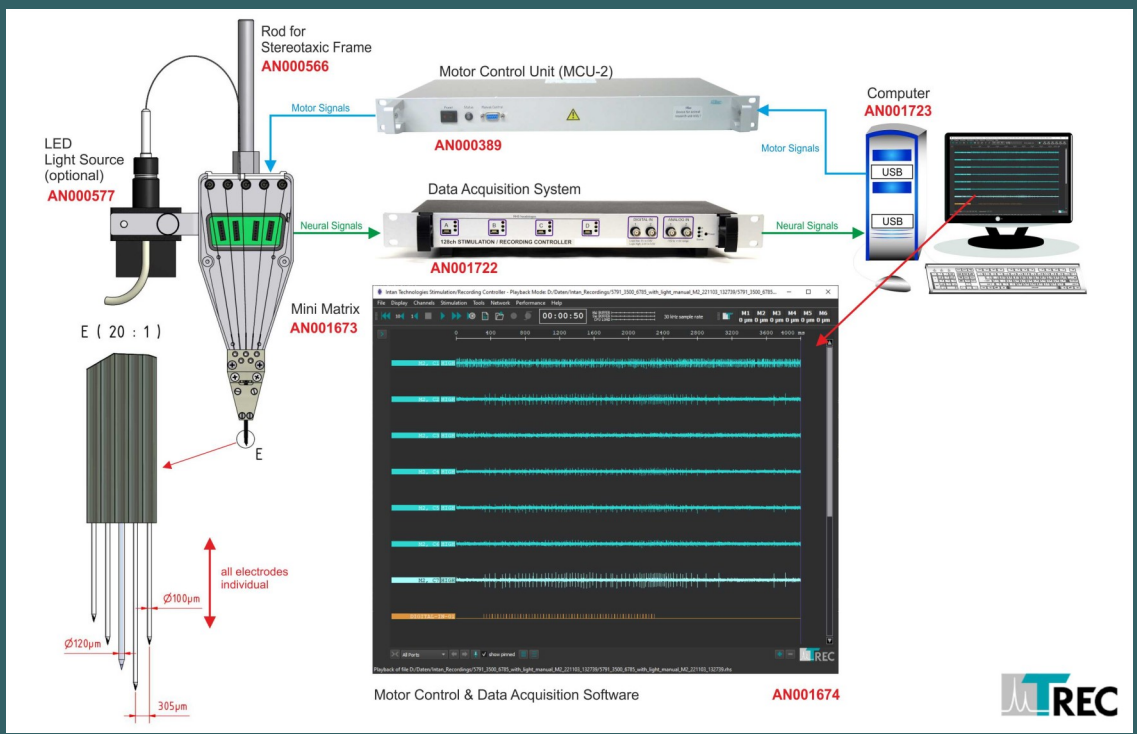


Schematic diagram of the Heptode Mini Matrix system for NHP applications with motor control unit (MCU-2) and intan data acquisition controller and graphical user interface to control the complete system .



Schematic diagram of the Heptode Mini Matrix system for rodent applications with motor control unit (MCU-2) and intan data acquisition controller and graphical user interface to control the complete system .

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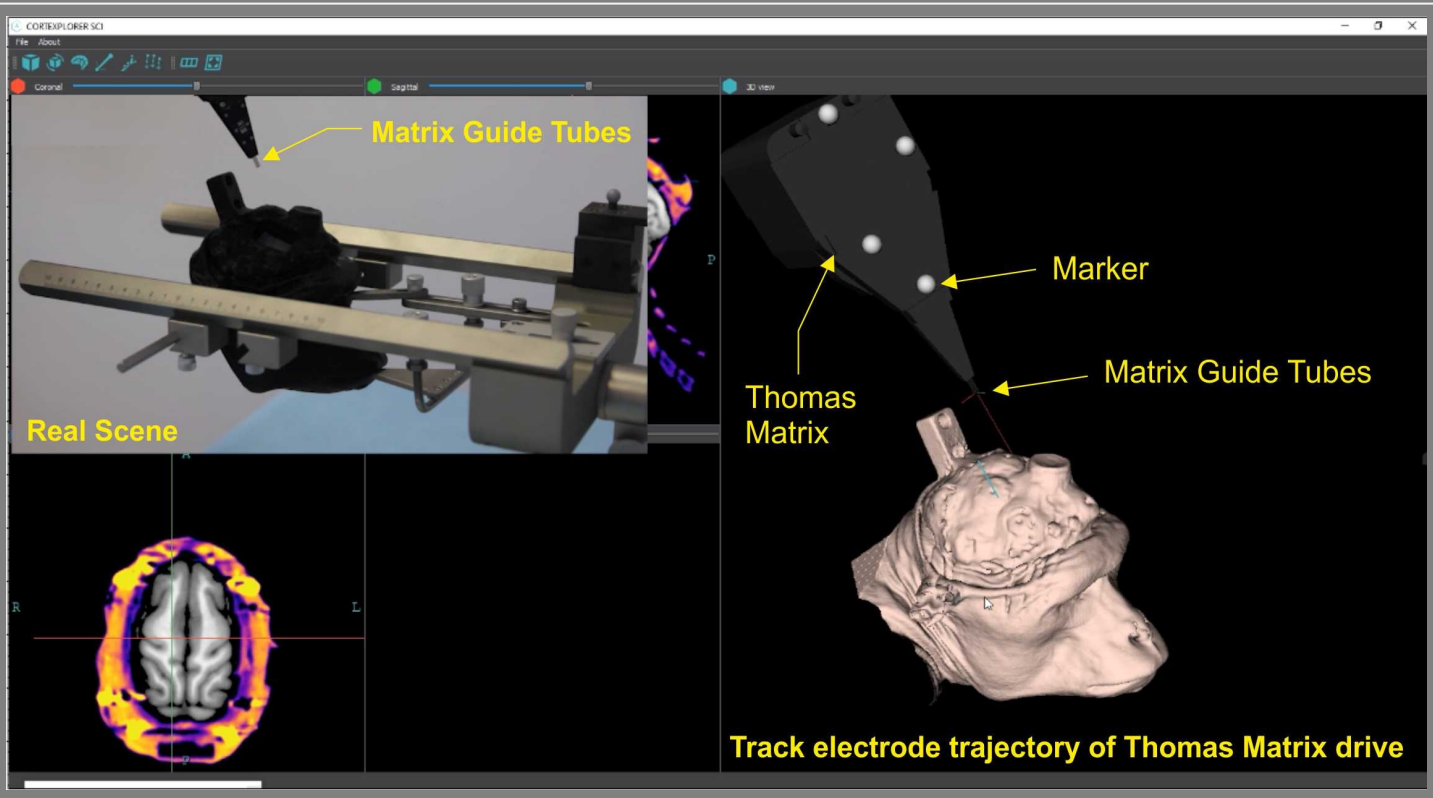

The graphical user interface of the CortExplore navigation system allows to track our Matrix microdrive by using special markers mounted the Matrix chassis surface (see picture above). The motor control unit of the Thomas Matrix microdrive sends the information about the position of each microelectrode in the brain to the CortExplore system. This enables the CortExplore navigation system software to display each electrode position on the screen in real time.

Neuronavigation

The CortExplore Navigation system allows you to create a 3D-representation of your surgical subject based on medical images and plan your surgery (e.g. implantation of a NHP recording chamber) and recording procedures virtually. We equip your Thomas microdrive with the required markers so that the microdrive can be tracked by the CortExplore system. We supply Cortexplore with the CAD models of our matrix with the customer-specific adaptations so that your exact matrix model can be displayed in the navigation software with the corresponding guide tube arrangements and lengths. We also supply Cortexplore with an application programming interface (API) for our motor controller so that the electrode positions can be transmitted to the navigation software in real time. You can create a 3D-printed model of your surgical subject to simulate parts of your procedure and instrument-handling under realistic conditions. During the experiment you can follow your surgical plans under high-resolution guidance. The combination of navigation system and Thomas matrix supports and guides you through your recording experiment procedures – reliable and precise. This method combination was recently published in:

Using camera-guided electrode microdrive navigation for precise 3D targeting of macaque brain sites

Crayen, M. A.; Kagan, I.; Esghaei, M.; Hoehl, D.; Thomas, U.; Prückl, R. & Schaffelhofer, S. u.a. (2024)

PLoS One, *19*(5) art. e0301849. DOI: https://doi.org/10.1371/journal.pone.0301849 .

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