

# ME2100-System

Modular Recording and Stimulation System for Up to 256 Channels



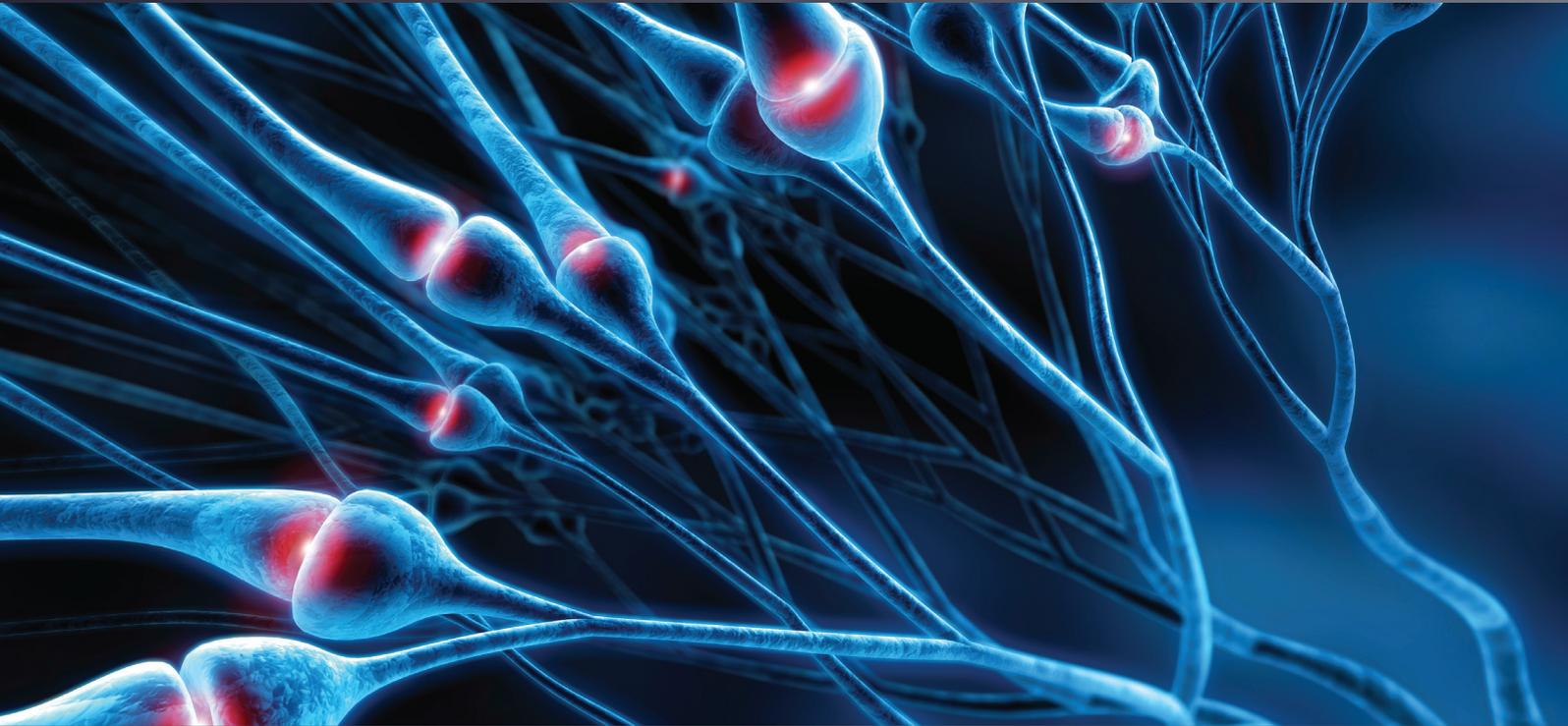
- Diverse applications—*in vivo*, *ex vivo*, organoids
- Scalability—up to eight 32 channel headstages for recording and arbitrary stimulation
- Up to 50 kHz sampling rate, 24 bit resolution for highest data accuracy in the field
- Control up to four lightsources to facilitate your optogenetic research



**multichannel\***  
**systems**

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# Gather Powerful *In Vivo* Data or Add New Research Possibilities to Your Cell Culture and Slice Recordings



Whether your electrophysiology experiments are done in *in vivo*, *ex vivo* or *in vitro*, from head fixed and anesthetized animals, over Langendorff or open chest epicardial mapping, brain organoids or cardiac bodies, getting precise data is key to earning viable and publishable results. No matter what direction you pursue highest data accuracy in the field should be what you are striving for — and we strive to support you in that ambition with powerful and reliable tools.

Multi Channel Systems ME2100 systems allows sampling rates up to 50 kHz at 24 bit AD conversion and a bandwidth from DC up to 10kHz (software selectable). That way we provide highest possible dynamic range to record small-amplitude and fast signals equally precise as huge amplitude and slow signals — don't miss a thing, don't clip a thing.

Fully customizable Flex MEAs widen the application of the setup for surface mapping of all electrically active tissue no matter the origin or size.

## Tethered Recording and Stimulation System with 16-256 Channels:

The ME2100 is a scalable tethered recording and stimulation system, your complete setup to study MEA (microelectrode array) data from anesthetized/head-fixed animals, slices, and organoids.

Scale the ME2100 system with the headstage types that match your application:

- Up to 8 lightweight  $\mu$ PA headstages for use on a conscious/moving animals
- Up to 8 32 channel headstages with recording/stimulation circuitry for headfixed/anesthetized animals or organoids and tissue slice preparations
- All headstages are galvanically isolated in the SCU to allow for independent or combined experiments
- Excellent signal/noise ratio for highest data accuracy and integrity with 24 bit resolution, 50kHz sampling rate, and a bandwidth from DC-10kHz



## ME2100-Headstages – Powerful Stimulation

The ME2100-HS36 allows arbitrary electrical stimulation on all channels of the connected array and comes with active artifact suppression circuitry. Headstages also bear additional outputs for extra-array electrical stimulation or optical stimulation to directly drive and control an LED. Stimulation (both optical and electrical) is mastered by the internal signal processor and operates with a feedback-delay around 1ms, for closed loop experiments. The ME2100-headstages sample incoming signals at 50 kHz per channel (24bit resolution), at an ultra-low noise level (0,7 $\mu$ VRMS) and a large signal input range ( $\pm$ 500mV) to detect even lowest signal amplitudes.





## ME2100-μPA-Headstages – Small and Light Design for Application on Awake and Behaving Animals

Benefit from the micro preamplifier's (μPA) very small size (with 16 or 32 electrode inputs from 17 mm x 17 mm x 2.5 mm) and its light weight (2g) to enable recordings from motile animals. The μPA-headstages sample incoming signals at 50 kHz per channel (24bit resolution), at an ultra-low noise level (1μVRMS) and a signal input range of ±250mV.



## Signal Collector Unit

The signal collector unit receives data from up to four headstages to increase the number of channels or run parallel experiments. Two signal collector units can be connected to one interface board.

Apart from receiving and transferring data, the SCU is also able to control up to four optical stimulation units, including high power LED.

All headstages are galvanically isolated in the SCU to allow for independent or combined experiments.

## Higher channel count with eight headstages

The ME2100-System offers the possibility to record from up to 8 headstages. You can connect two signal collector units to one interface board. Each signal collector unit can receive data from up to four headstages. Thereby, you can build a system with 8 headstages, recording from up to 256 channels.

The interface board and signal collectors are equipped for this high channel count from the beginning. This way, you can start with one headstage (16 or 32 channels) and add-on more as you go. This gives you the flexibility to adjust the system to your changing experimental needs.

## Electrode arrays

The ME2100-System can be operated with most commercially available probes. Multi Channel Systems offers flexible MEAs, made of polyimide foil. The FlexMEA32 and EcoFlexMEA36 can be connected directly to the ME2100-headstage. We use industry standards to be compatible with common and relevant *in vivo* probe suppliers, and offer a wide variety of adapters—in case your probe design goes beyond these. Probes with Omnetics connector can be connected via an adapter. We have a wide range of adapters available. If you do not find the one you need, please contact us. We will certainly find a solution that fits your needs.

## Interface Board Multiboot

The Multiboot Interface Board facilitates operation of all MCS *in vitro* and *in vivo* headstages within the entire 2100 amplifier solution suite. This suite includes: MEA2100-HS, Multiwell- MEA-HS, CMOS-MEA-HS, MEA2100-Beta-Screen-HS, W2100-HS and ME2100-HS. The modular 2100 amplifier solution suite design makes it easy to modify your lab equipment generally with modest hardware upgrade investments.

It comes with a freely programmable digital signal processor, which can be used for closed-loop stimulation and features various analog and digital in- and outputs for integration of auxiliary data and timestamps for synchronization with other devices.





## Real-Time Signal Detection and Feedback

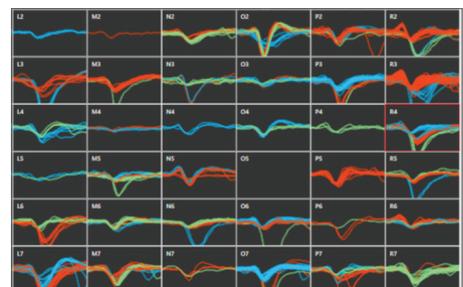
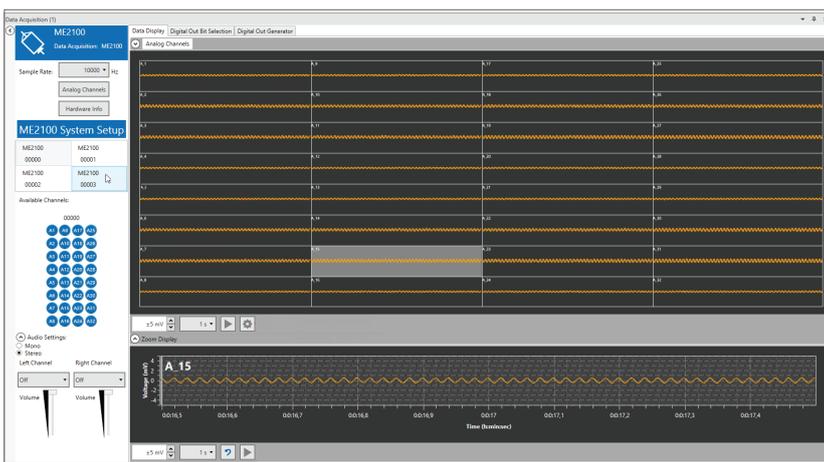
The real-time signal detection/feedback is an advantageous feature if you need fast and predictable reactions related to recorded analog signals with minimum time delay. Moving the feedback feature to the onboard DSP shortcuts the detour through a PC (otherwise up to 100ms, depending on OS and performance), and allows feedback stimulation with a delay <1ms.

## Computer and Software

The last component of the system is the computer with the software package Multi Channel Suite. The MC\_Suite consists of three modules. Installation on several computers, its use and all future upgrades that are considering customer feedback, are free of charge.

- Multi Channel Experimenter is the data acquisition and online analysis tool. With an easy-to-use drag'n'drop interface, you simply create your virtual experiment with e.g. data source, filters, spike detection, and recorder.
- Multi Channel Analyzer is the offline analysis tool. You just import the data recorded with the Multi Channel Experimenter and then define your in-depth analysis with more instruments. The Multi Channel Analyzer also supports synchronized video input.
- Multi Channel DataManager facilitates the data export for analysis with third-party programs. It supports all files generated with the Multi Channel Experimenter and then exports the data into HDF5 (\*.h5) (Matlab, Python, R, etc.), NeuroExplorer (\*.nex), Spike2 (\*.smr), ASCII file (\*.txt), or European Data Format (\*.EDF+).
- Coming soon: The Multi Channel Experimenter already allows spike detection in real time. To complete this tool, MCS is currently working on unsupervised on-line spike sorting, which is going to be released in spring 2019.

A pre-configured PC can be purchased optionally (recommended). If you do opt out of purchasing an MCS pre-configured PC, please reach out to us for minimum spec requirements.





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