**Multiwell-MEA-System: Technical specifications**

**General characteristics**
- Dimensions: 302 mm x 166 mm x 90 mm
- Weight: 4 kg

**Amplifier**
- Data resolution: 24 bit
- Number of recording channels: 288
- Bandwidth: 0.1 Hz - 10 kHz

**Stimulus generator**
- Current stimulation: ± 500 µA
- Voltage stimulation: ± 10 V

**Data converter and USB interface**
- Control interface: USB 3.0
- Sampling rate per channel: up to 50 kHz

**Heating element and temperature sensor**
- Temperature sensor type: PT 100 with 4 wire connection
- Accuracy of regulation: ± 0.1 °C

**Software**
- Operating system: Windows 8.1 (64 bit) (English and German versions supported)
- Data acquisition: Multiwell-Screen, Version 1.5.6.0 and higher
- Analysis software: Multiwell-Analyzer, Version 1.2.3.0 and higher

**Well plate variants**

<table>
<thead>
<tr>
<th>Well Plate</th>
<th>Base Material</th>
<th>Diameter of Electrodes</th>
<th>Interelectrode Distance</th>
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High throughput electrophysiology for screening featuring a 24- and 96-well plate format, the Multiwell-MEA System from Multi Channel Systems is the perfect tool for medium and high throughput electrophysiology. Being based on the MEA2100-technology, it includes high-quality, invasive amplifiers, freely-programmable stimulators, and a digital signal processor for individual analyses. One big advantage of the Multiwell-MEA System is the high sampling rate. Your data is sampled at up to 50 kHz per channel. Thus, the accuracy of your data is guaranteed, whether you record from cardiac or neuronal samples.

The Multiwell-MEA System from Multi Channel Systems consists of 4 components:

- **Well plates**
  - Available with 24 or 96 wells
- **Headstage**
  - Amplifier & stimulator
- **Interface Board**
  - Connecting to computer, various interfaces for synchronization
- **PC & Software**
  - Data visualization and analysis

**Well plates**

Multi Channel Systems offers two kinds of well plates. The 24-well plate has 12 electrodes per well, arranged in a 2x6 grid. The 96-well plate features 5 or 12 electrodes per well. In all well plates, there is an internal reference electrode in each well, and each electrode can be selected for stimulation.

The base of the well plates is made of an opaque epoxy substrate or a transparent glass base, with substrate-integrated gold electrodes. On the 24-well plate version, there are also well plates with a transparent glass base with RGD-coated gold electrodes available. On the bottom of the well plates, you will see the contact pads, which connect to the contact pins of the headstage.

**Interface board 3.0 multiboard**

The MCS-3.0 multiboard is a new generation of interface boards, which is able to receive data from multiple MCS in vivo and in vitro recording systems, which makes cost-effective combinations with only one interface board and multiple recording systems possible.

As a result, you have even more flexibility in switching between possible configurations for your specific research needs. You can establish your experiments for example on 60 or 120 electrodes with the MEA2100 System, then purchase the Multiwell-headstage and start high throughput screening.

This perfectly combines both high resolution and high throughput electrophysiology.

**Multiwell headstage**

The headstage is the core element of the system. It houses the well plate, amplifier and digitizer of the signals, and has an integrated stimulus generator.

The brackets can be opened and closed either by pushing the buttons on the housing or with a single mouse click in the software. By closing the brackets, the contact pads of the well plate connect to the contact pins.

The built-in amplifier makes sure that the recorded signals are amplified close to the signal source, thereby minimizing noise. The data is then sampled at up to 50 kHz, ensuring an excellent data quality.

The headstage also provides an integrated stimulator, which can generate various signal shapes. You can select any electrode for stimulation and design the signal shape via the included software.

The recording chamber can be covered and has an inlet for CO₂. A climate chamber with integrated Faraday cage allows noise-free recordings and controlled pH, temperature and humidity. Additionally, it has an integrated temperature controller which regulates the temperature of the heating plate right below the wellplates.

**Data analysis with Multiwell-Screen software**

The Multiwell-Screen software package is designed specifically for the needs of screening experiments with the Multiwell-MEA Systems. In the beginning, you select the electrode configuration (24 or 96 electrodes) and then have a tool set specialized for neuronal or cardiac cell recording.

Within the same software, you can design the stimulation patterns and decide when and where you want to stimulate.

The separate analysis software (Multiwell-Analyzer), which is also included in the system, provides further tools for detailed offline analysis.

Both tools are designed for repeated screening experiments, so saving your settings and experimental layout is quick and easy. As a policy at Multi Channel Systems, updates of the Multiwell Screen software package will be available online and free of charge, so you are always up-to-date with recent developments.

**Key features**

- Automated report generation (dose-response data, raw data plate and overlay plots)
- CiPA compliant plate layout as predefined template
- Flexible export of results and raw data (dose-response data, raw data)
- Curve fitting with compliance imaging format reporting form
- Software supports single and cumulative dosing
- Automated locking mechanism – easy to integrate into your existing liquid handling platform
High throughput electrophysiology for screening

featuring a 24- and 96-well plate format, the Multiwell-MEA-System from Multi Channel Systems is the perfect tool for medium and high throughput electrophysiology. Being based on the MEA3000 technology, it includes high-quality, invasive amplifiers, freely programmable stimulators, and a digital signal processor for individual analyses.

One big advantage of the Multiwell-MEA-System is the high sampling rate. Your data is sampled at up to 50 kHz per channel. Thus, the accuracy of your data is guaranteed, whether you record from cardiac or neuronal samples.

Set up

The Multiwell-MEA-System from Multi Channel Systems consists of 4 components:

- **Well plates**
  - Available with 24 or 96 wells
- **Headstage**
  - Amplifier & stimulator
- **Interface Board**
  - Connects to computer, services on analog/digital for synchronization
- **PC & Software**
  - Data visualization and analysis

**Well plates**

Multi Channel Systems offers two kinds of well plates. The 24-well plate has 12 electrodes per well, arranged in a 4x3 grid. The 96-well plate features either 3 or 12 electrodes per well. In all well plates, there is an internal reference grid. The 96-well plate version, which consists of 3 or 12 electrodes per well, is available for stimulation and design the signal shape via the included software Multiwell-Screen.

**Interface board 3.0 multiboard**

The Interface board 3.0 multiboard is a new generation of interface boards, which is able to receive data from multiple MCS in vivo and in vitro recording systems, which makes cost-effective combinations with only one interface board and multiple recording systems possible. As a result, you have even more flexibility in choosing between possible configurations for your specific research needs. You can establish your experiments for example on 60 or 120 electrodes with the MEA3000, then purchase the Multiwell-headstage and start high throughput screening.

Multiwell headstage

The headstage is the core element of the system. It houses the well plate, amplifiers and digitizes the signals, and has an integrated stimulus generator.

The brackets can be opened and closed either by pushing the buttons on the housing or with a single mouse click in the software. By closing the brackets, the contact pads of the well plate connect to the contact pins. The built-in amplifier makes sure that the recorded signals are amplified close to the signal source, thereby minimizing noise. The data is then sampled at up to 50 kHz, ensuring an excellent data quality.

The headstage also provides an integrated stimulus, which can generate various spike signals. You can select any electrode for stimulation and design the stimulus shape via the included software Multiwell-Screen.

**Data visualization and analysis**

The recording chamber can be covered and has an inlet for CO₂. For complete control, the headstage offers an integrated temperature controller which regulates the temperature of the heating plate right before the wellplates.

**Data analysis with Multiwell-Screen software**

The Multiwell-Screen software package is designed specifically for the needs of screening experiments with the Multiwell-MEA-System. In the beginning, you select whether you record from neuronal or cardiac cells, and then have a tool set specialized for your application.

With both tool sets, you can display your data in real-time on the entire well plate, zoom into one single well and see the signal on one single electrode. You can also filter the data (high-pass, low-pass, Butterworth, Notch etc.) and record digital events.

The software gives you the option to plot information on the applied compounds and then calculates the corresponding dose-response curves automatically. Therby, you can choose if you want to analyze your data for:

- **Field potential duration**
- **Peak-to-peak**
- **RR-interval**
- **Spikes count**

Within the software, you can design the stimulation patterns and decide when and where you want to stimulate.

The separate analysis software Multiwell-Analyzer, which is also included in the system, provides further tools for detailed offline analysis.

Both tools are designed for repeated screening experiments, so saving your settings and experimental layout is quick and easy. As a policy at Multi Channel Systems, updates of the Multiwell-Screen software package will be available online and free of charge, so you are always up-to-date with recent developments.

**Key features**

- Automated report generation (dose-response data, raw data and overlay plots)
- PDF compliant report layout as predefined template
- Flexible report of results and raw data – Direct export into PDF reporting forms
- Software supports single and cumulative dosing
- Automated locking mechanism – Easy to integrate into your existing liquid handling platform
High throughput electrophysiology for screening

**Multiwell headstage**

The headstage is the core element of the system. It houses the well plate, amplifies and digitizes the signals, and has an integrated stimulus generator.

The brackets can be opened and closed either by pushing the buttons on the housing or with a single mouse click in the software. By closing the brackets, the contact pads of the well plate connect to the contact pins. The built-in amplifier makes sure that the recorded signals are amplified close to the signal source, thereby minimizing noise. The data is then sampled at up to 50 kHz/channel, ensuring an excellent data quality.

The headstage also provides an integrated stimulator, which can generate square or triangular signals. You can select any electrode for stimulation and design the signal shape with the included software Multiwell-Screen.

The recording chamber can be covered and has an inlet for CO₂. A climate chamber with integrated liquid cooling allows continuous recordings and control of the temperature and humidity.

Additionally, it has an integrated temperature controller which regulates the temperature of the heating plate right below the wellplates.

**Well plates**

Multi Channel Systems offers two kinds of well plates. The 24-well plate has 12 electrodes per well, arranged in a 4x4 grid. The 96-well plate features either 3 or 12 electrodes per well. In all well plates, there is an internal reference grid. The 96-well plate has a transparent glass base, with substrate-integrated gold electrodes. In the 24-well plate version, there are also well plates with a transparent glass base with PEDOT-coated gold electrodes available.

On the bottom of the well plates, you will see the contact pads, which connect to the contact pins of the headstage.

**Interface board 3.0 multiboard**

The MCS-48-3.0 multiboard is a new generation of interface boards, which is able to receive data from multiple MCS in vivo and in vitro recording systems, which makes cost-effective combinations with only one interface board and multiple recording systems possible.

As a result, you have even more flexibility in switching between possible configurations for your specific research needs. You can establish your experiments for example on 60 in vivo and/or in vitro recording systems, which makes Multiwell-Screen particularly useful for repeated screening experiments. In the beginning, you select whether you record from neuronal or cardiac cells, and then have a tool set specialized for your application.

With both tool sets, you can display your data in real-time on the entire well plate, zoom into one single well and see the signal on one single electrode. You can also filter the data high-pass, low-pass, Butterworth, notch etc. and record digital events.

The software gives you the option to input information on the applied compounds and then calculates the corresponding dose-response curves automatically. Thereby, you can choose if you want to analyze your data for:

- Field potential duration (FDP)
- Spike
- Peak-to-peak
- All-interval
- Spike count.

Within the same software, you can design the stimulation patterns and decide when and where you want to stimulate.

The separate analysis software Multiwell-Analyzed, which is also included in the system, provides further tools for detailed offline analysis.

Both tools are designed for repeated screening experiments, so saving your settings and experimental layout is quick and easy. As a policy at Multi Channel Systems, updates of the Multiwell-Screen software package will be available online and free of charge, so you are always up-to-date with recent developments.

**Key features**

- Automated report generation (dose-response data, raw data, and stimulation patterns)
- CIPA-compliant plate layout as predefined template
- Flexible report of results and raw data – Direct export into CIPA reporting forms
- Software supports single and cumulative dosing
- Automated locking mechanism – Easy to integrate into your existing liquid handling platform

**Data analysis with Multiwell-Screen software**

The Multiwell-Screen software package is designed specifically for the needs of screening experiments with the Multiwell-MEA-Systems. In the beginning, you select whether you record from neuronal or cardiac cells, and then have a tool set specialized for your application.

With both tool sets, you can display your data in real-time on the entire well plate, zoom into one single well and see the signal on one single electrode. You can also filter the data high-pass, low-pass, Butterworth, notch etc. and record digital events.

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Multiwell-MEA-System: Technical specifications

General characteristics
- Dimensions: 302 mm x 166 mm x 90 mm
- Weight: 4 kg
- Interface board: 250 mm x 88 mm x 25 mm
- Interface board: 0.3 kg

Data acquisition and control
- 24-bit data resolution
- Number of recording channels: 288
- Bandwidth: 0.1 Hz - 10 kHz
- Sampling rate per channel: up to 50 kHz

Stimulus generator
- Current stimulation: ±500 µA
- Voltage stimulation: ±10 V

Data converter and USB interface
- Control interface: USB 2.0
- Sampling rate per channel: up to 50 kHz

Heating element and temperature sensor
- Temperature sensor type: PT 100 with 4 wire connection
- Accuracy of regulation: ±0.1 °C

Operating system
- Windows 8.1 (64 bit) (English and German versions supported)

Data acquisition software
- Multiwell-Screen, Version 1.5.6.0 and higher

Analysis software
- Multiwell-Analyzer, Version 1.2.3.0 and higher

Well plate variants

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www.multichannelsystems.com

Multiwell-MEA-System
High throughput electrophysiology

- 24- and 96-well plates with up to 1152 electrodes
- Up to 50 kHz sampling rate
- Integrated stimulator
- Different well plate variants
- 24 bit data resolution
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NEW
1152 Electrodes

Multiwell-MEA-System
High throughput electrophysiology

- 24- and 96-well plates with up to 1152 electrodes
- Up to 50 kHz sampling rate
- Integrated stimulator
- Different well plate variants
- 24 bit data resolution