



32-Channel Miniature Preamplifier MPA32I Manual



Imprint

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Multi Channel Systems MCS GmbH

Aspenhaustraße 21

72770 Reutlingen

Germany

Phone +49-71 21-909 25 - 0

Fax +49-71 21-909 25 -11

sales@multichannelsystems.com

www.multichannelsystems.com

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1 Important Information and Instruction

1.1 Operator's Obligations

The operator is obliged to allow only persons to work on the device, who

- are familiar with the safety at work and accident prevention regulations and have been instructed how to use the device;
- are professionally qualified or have specialist knowledge and training and have received instruction in the use of the device;
- have read and understood the chapter on safety and the warning instructions in this manual and confirmed this with their signature.

It must be monitored at regular intervals that the operating personnel are working safely.

Personnel still undergoing training may only work on the device under the supervision of an experienced person.

1.2 Guarantee and Liability

The general conditions of sale and delivery of Multi Channel Systems MCS GmbH always apply. The operator will receive these no later than on conclusion of the contract.

Multi Channel Systems MCS GmbH makes no Guarantee as to the accuracy of any and all tests and data generated by the use of the device or the software. It is up to the user to use good laboratory practice to establish the validity of his findings.

Guarantee and liability claims in the event of injury or material damage are excluded when they are the result of one of the following.

- Improper use of the device.
- Improper installation, commissioning, operation or maintenance of the device.
- Operating the device when the safety and protective devices are defective and/or inoperable.
- Non-observance of the instructions in the manual with regard to transport, storage, installation, commissioning, operation or maintenance of the device.
- Unauthorized structural alterations to the device.
- Unauthorized modifications to the system settings.
- Inadequate monitoring of device components subject to wear.
- Improperly executed and unauthorized repairs.
- Unauthorized opening of the device or its components.
- Catastrophic events due to the effect of foreign bodies or acts of God.

1.3 Important Safety Advice



Warning: Make sure to read the following advices prior to install or to use the device and the software. If you do not fulfill all requirements stated below, this may lead to malfunctions or breakage of connected hardware, or even fatal injuries.



Warning: Obey always the rules of local regulations and laws. Only qualified personnel should be allowed to perform laboratory work. Work according to good laboratory practice to obtain best results and to minimize risks.

The product has been built to the state of the art and in accordance with recognized safety engineering rules. The device may only

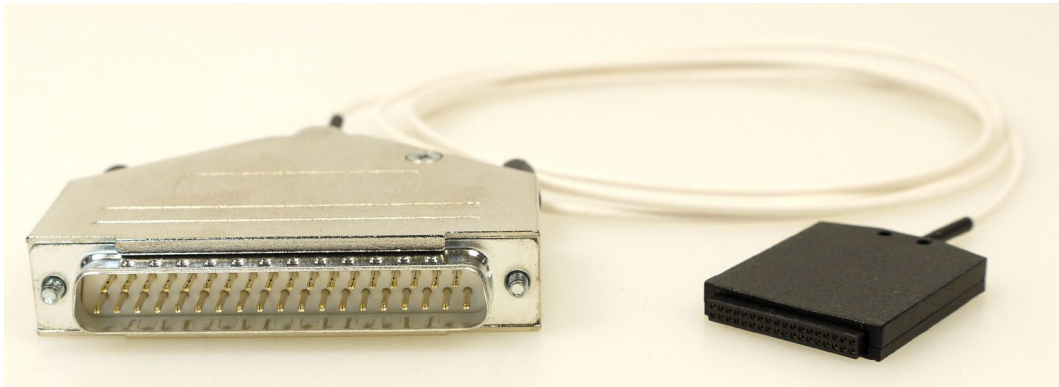
- be used for its intended purpose;
- be used when in a perfect condition.
- Improper use could lead to serious, even fatal injuries to the user or third parties and damage to the device itself or other material damage.



Warning: The device and the software are not intended for medical uses and must not be used on humans. MCS assumes no responsibility in any case of contravention.

- Malfunctions which could impair safety should be rectified immediately.
- Any physical damage of the cable, such as a broken cable, causes a physical damage of the miniature preamplifier that cannot be repaired.
- Protect the device from heat. Do not autoclave!
- You can clean the connectors with distilled water in an ultra sonic bath, but keep the cable away from the fluid. Dry the device with compressed air.
- Use and keep the device always in a dry environment. Do not expose it to fluids or vapor for a longer period of time.

2 Welcome to the MPA32I



The 32-Channel Miniature Preamplifier MPA32I is connected to the microelectrodes for providing the initial tenfold amplification stage.

It has additional **common ground** and **reference electrode inputs**. The reference electrode is ideally identical to the recording electrodes and placed into a comparable but inactive area or tissue. Background or noise signals that are picked up by both the reference electrode and the recording electrodes are removed.

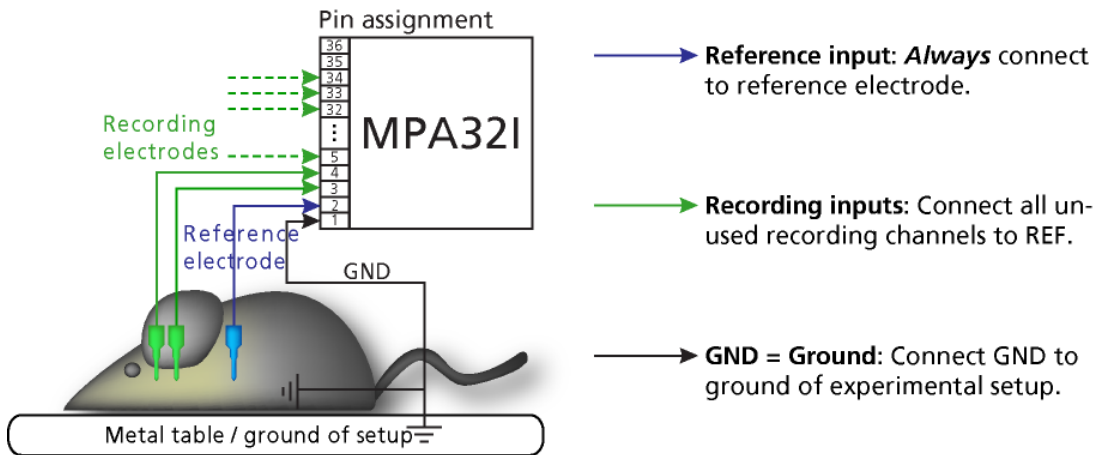
The metal case provides electrical shielding. Electrode damage is prevented by the very low bias current. The **high input impedance** ensures stable long-term recordings: Ideally, the input impedance would be infinite. As low voltages are generally recorded, a high current would flow if the input impedance were low. As a result, the amplifier would not be able to deliver the current, and the voltage would break down. The miniature preamplifier has a high input impedance to avoid this problem.

Adapters for all standard **microelectrodes** such as NeuroNexus probes (from www.neuronexustech.com) for acute and chronic implantations ensure a close proximity to the probe to minimize signal loss and cross talk. Adapters are not included in the standard scope of delivery and have to be ordered separately. For custom adapters, please ask your local retailer or contact Multi Channel Systems.

3 Setting Up and Connecting the MPA32I

3.1 General Setup Recommendations

Miniature preamplifier setup



In the following, you find general recommendations for the installation.

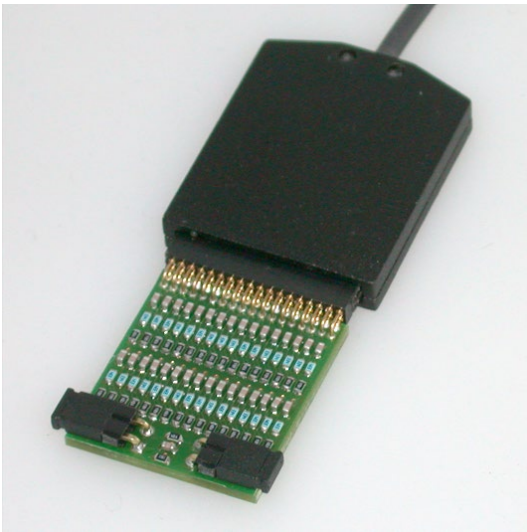
Important: It is important that the complete setup refers to a single common ground. The reference input has always to be connected. It is recommended to use a reference electrode. However, if you are not using a reference electrode, connect the reference input to ground (GND). Otherwise, noise picked up by the reference input will be subtracted from the recording signals. This will either lead to signal loss or to a very high noise level.

1. Ground the animal with a **ground electrode** of large surface area, for example, a liquid gel adhesive electrode, that is connected to the ground of the setup, for example, a large metal table or a **Faraday cage**, to avoid pickup of noise from the environment. The ground electrode is best positioned in an electrically inactive region (not near muscle, nor heart), for example, at the belly.
2. Connect the **GND input** or the metal case of the miniature preamplifier to the **common ground** of the setup. (The GND input is internally connected to the metal case.)
3. Connect the **reference electrode to the reference input** of the miniature preamplifier. Generally, a reference electrode is inserted into non-active tissue of the experimental model. The reference electrode should be identical to the recording electrode so that both electrodes see the same background noise. This is necessary because despite the grounding, the animal's body often has not exactly a potential of zero, due to the electrode impedance, for example. The background noise is then subtracted from the recording signal, increasing the signal to noise ratio. Please note that this may not work if the complete setup is not properly grounded.
4. (Optional) If two reference electrodes are used, connect the second electrode to the free reference input. Otherwise, leave it free. It is generally not necessary to use a second reference electrode. It can be used to enlarge the surface area of the reference, though.
5. Connect the **recording electrodes** to the **recording channels** of the miniature preamplifier. You can either use single electrodes or multitrodes with the miniature preamplifier. MCS provides adapters for standard probes.
6. Connect all unused recording channels to the **GND input** or to the reference electrode if the reference and ground electrode of the amplifier are short circuited, to avoid noise pickup. As the total amplifier gain generally lies in the range of 1000, even very small noise signals may generate high noise signals.

7. If you are not using a Faraday cage, it might be necessary to shield the complete setup with aluminum foil or similar to prevent electrical interference from the outside. Connect the aluminum foil to the ground of the setup (for example, the metal table).

Troubleshooting: If you observe problems with noise, check that the ground of the setup is connected to exactly the same ground as the data acquisition computer. For example, connect the metal table to the ground / earth wire of a free power outlet (of the same electrical system), as the computer is generally connected to ground/earth via the power plug, too. Also, connect the data acquisition computer's metal case with a thick ground wire to the ground of the setup (for example, the metal table), preferably with a 4 mm plug.

3.2 Testing the Noise Level of the Setup



A **terminal plug** that connects all inputs to ground, and a **test model probe** that mimics the electrode impedance are available for testing the noise level of the setup.

Note: Please note that the test model probe has to be ordered separately.

All instruments were thoroughly tested at the factory site before delivery. The suggested tests are mainly intended for optimizing and troubleshooting your setup, to exclude any damage that might have occurred during transportation, or to fulfill your own guidelines, for instance. It will take only a few minutes time and can save time and trouble in the long run. Multi Channel Systems recommends running these tests before you start your real experiments.

1. Connect the terminal plug to one miniature preamplifier and the test model probe to the other as shown in the picture (do not mismatch the polarity). If you have only one MPA32I, you can perform the two tests consecutively.
2. Connect the MPA32I with the **test model probe** to channels 1 to 32 of the signal collector.
3. Connect the MPA32I with **terminal plug** to channels 33 to 64 of the signal collector.
4. Make sure that all other connections are appropriate, and that your setup has an appropriate grounding and shielding as recommended in the chapter "General Setup Recommendations".

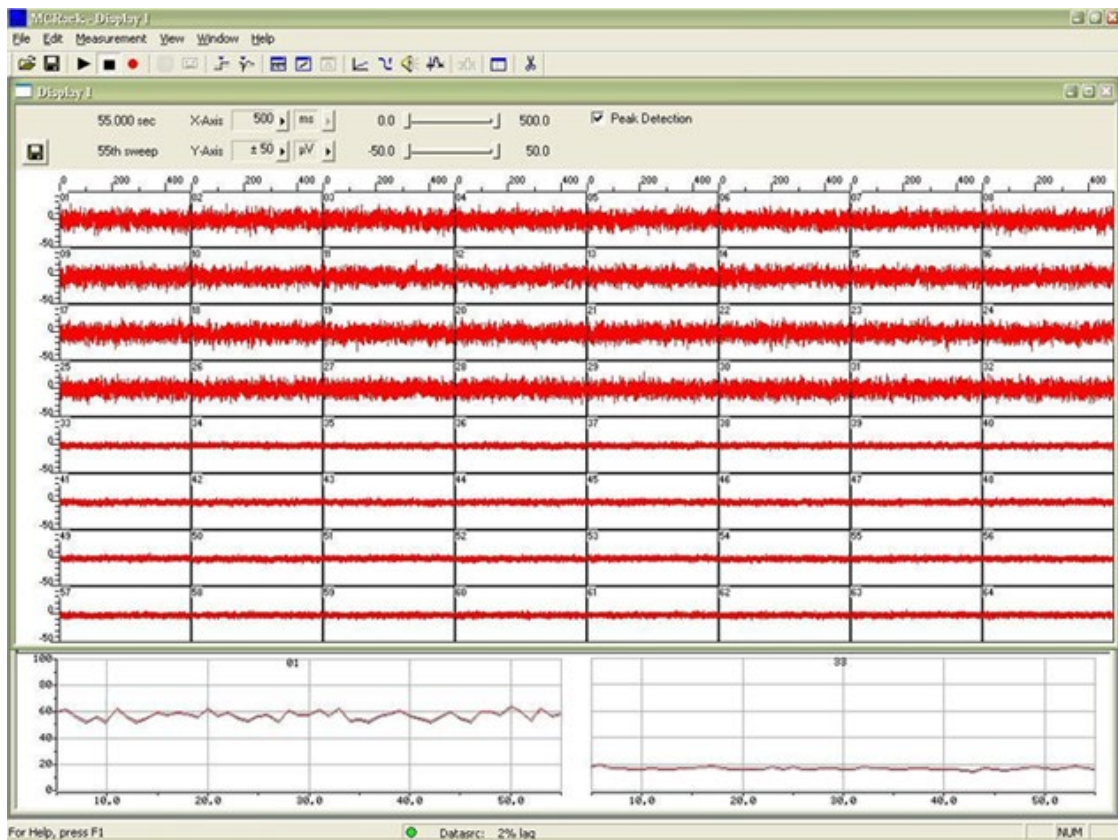
4 Setting up MC_Rack

Please refer to the MC_Rack Manual for more information.

- Start MC_Rack.
- Open the file MPA32I_NoiseTest.rck on the installation volume (see folder **Tutorial**). This rack contains the virtual **MC_Card** instrument as data acquisition device with a continuous raw data display and an **Analyzer** to measure the peak-to-peak amplitude.
- Click **Start** to start the recording.
- — OR — Set up the rack on your own:
 - Click **Data Source Setup** on the **Edit** menu. Select a 1-dimensional layout. Select the number of electrode channels (at least 32).
 - Add the **data acquisition** to your virtual rack.
 - In the tree view pane of the virtual rack, select the **data acquisition**, and click the **Hardware** tab. Enter the total amplifier gain according to the specifications of the instruments. For example, for a miniature preamplifier with a gain of 10 and a following filter amplifier with a gain of 100, the total gain is 1000.
 - Select an **input voltage range** of **-819.2 to +818,8 mV** and a **sampling rate** of **10000 Hz**.
 - On the **Edit** menu, click **Add Data Display** to add a raw data display to your virtual rack.
 - In the virtual rack tree view pane, select the **Display 1** and click the **Layout** tabbed page. Set up a channel map with **channels 1 to 64**.
 - Adjust the display ranges to **500 ms** and **+/-50 µV**.
 - On the **Edit** menu, click **Add Analyzer** to add an **Analyzer** to the virtual rack. Select all or two typical channels on the **Channels** tabbed page. Select the **Peak-Peak Amplitude** parameter on the **Analyzer** tabbed page.
 - On the **Edit** menu, click **Add Parameter Display** to add a **Parameter Display** to the virtual rack.
 - In the virtual rack tree view, select the **Display 2** and click the **Layout** tabbed page. Set up a channel map with all channels that were assigned to the **Analyzer**.
 - Click the **Ranges** tabbed page and enter 0 to 10 s for the x- range and 0 to 100 µV for the y- range.

Typical Results

Typical results of this test are shown in the following screen shot. The filter amplifier used for this test had a gain of 100 and a bandwidth of 0.5 to 5000 Hz (FA64I-100-0.5-5000). If you use a filter amplifier with a narrower bandwidth, you can generally expect a slightly lower noise level.



Noise level test with #MPA8I and FA64I-100-0.5-5000 filter amplifier.

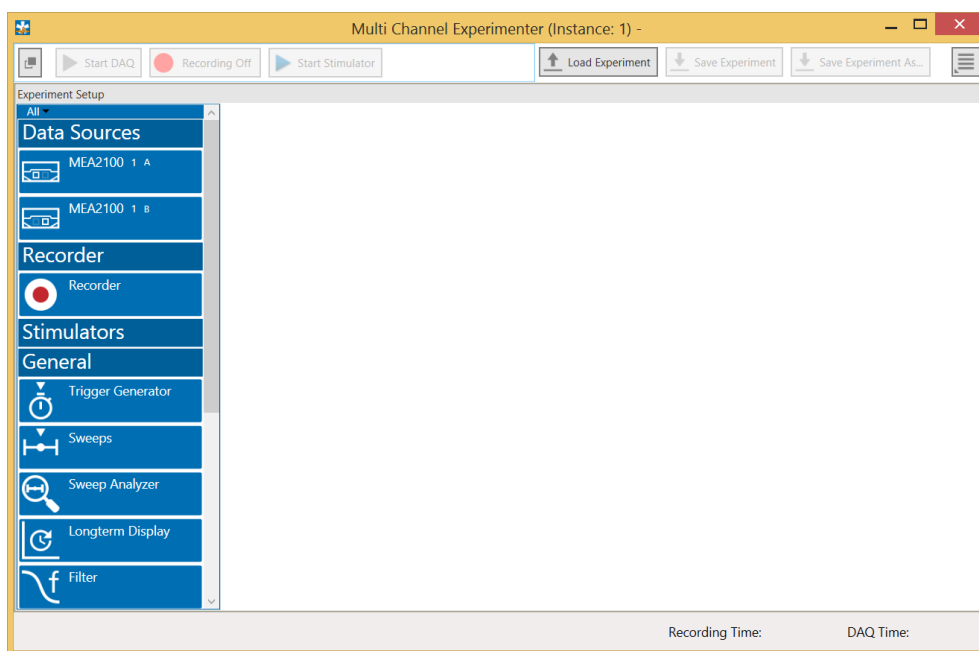
The noise level is 60 μV peak to peak with the provided test model probe (channels 1 – 32) and 20 μV peak to peak with grounded inputs (channels 33 – 64). The top window shows raw data; the bottom window shows the extracted peak-to-peak amplitudes of channels 1 and 33. (The miniature preamplifier was shielded by a metal case connected to the ground / earth of the test lab.)

5 Multi Channel Experimenter

Double-click the Multi Channel Experimenter icon or select Multi Channel Experimenter from the "Start" menu. The program starts. The main window opens automatically: "Multi Channel Experimenter (Instance: 1)". It is possible to open up to four instances in parallel. Operation is independent for each instance.

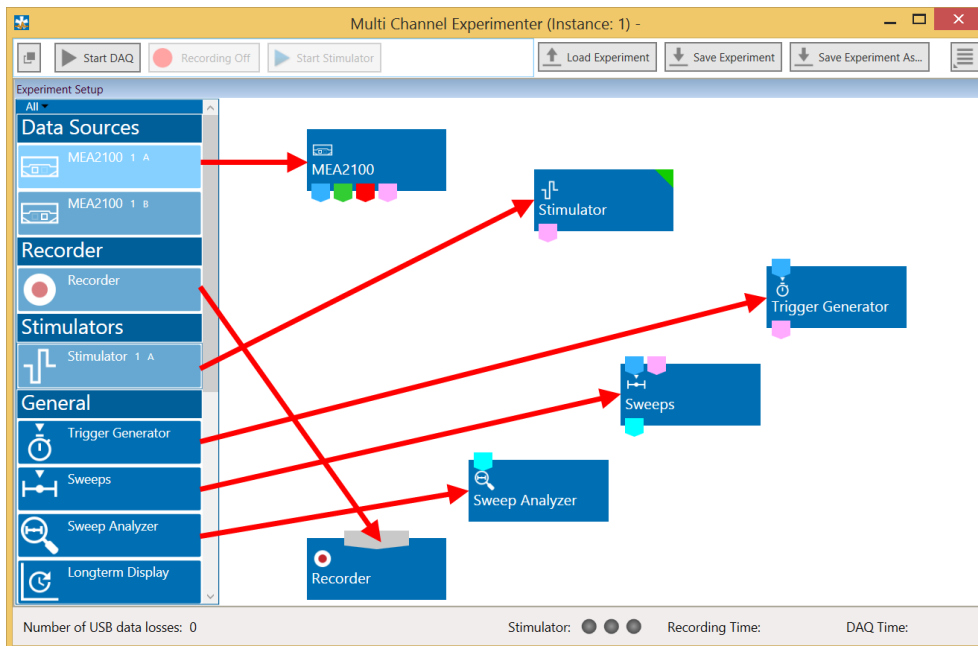
This is your virtual rack configuration in the "Experiment Setup" window, which is blank after program start. On the left side five classes of instruments are provided: "Data Sources", "Recorder" and "Stimulators" are hardware components. The virtual instruments available up to now are divided in "General" and application specific "Neuro".

The header of the dialog contains five buttons: "Start DAQ", "Start Recording", "Load Experiment" and "Save Experiment" in the main toolbar on the left and the "Menu" button on the right. In the bar down under the "Recording Time" and the "DAQ Time" are registered.

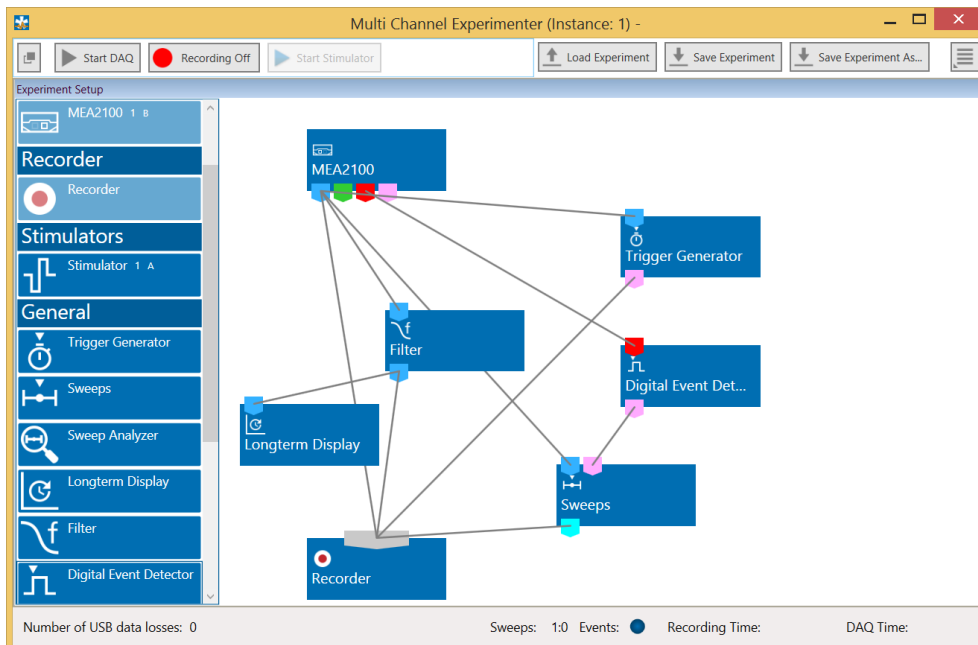


Building a Rack

It is very easy to build a rack: Please click onto the button of the desired instrument and move it via drag and drop from the left to the right side of the main window!



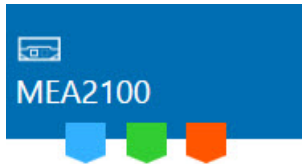
It is also easy to connect the instruments: Please click onto one of the symbols on the lower part of an instrument button to connect this output port via drag and drop with the input port (symbol on the upper side) of the target instrument. Please read the next chapter.



Move as many instruments as you need via drag and drop into the “Experiment Setup” window. It is possible to use the virtual tools more than one time.

Conventions for Building a Rack

Please consider the rules for connecting the instruments. The Multi Channel Experimenter program allows only connections between output ports at the lower side of the device to the input port on the upper side of the target device. The input and output ports of the devices are color coded for a better assignment of the instruments. The blue symbol represents the port for the "Electrode Raw Data". The green symbol represents the port for the "Auxiliary Analog Data". The red symbol represents the port for the "Digital Data".



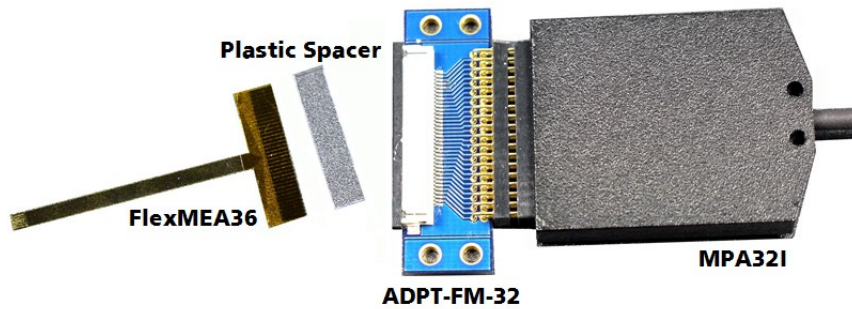
Three color coded output ports of the MEA2100 data acquisition device.

Example: Click on the blue symbol output port of the data source and connect it by drag and drop with the blue symbol input port of the filter. The electrode raw data stream will flow from the data source to the filter. Connect the blue symbol output port from the filter with the black symbol input port of the recorder.

The electrode raw data stream will flow from the filter to the recorder. The black input port of the recorder accepts all types of input data streams and you can connect more than one data stream.



6 Connecting FlexMEAs



FlexMEA36, plastic spacer and adapter (ADPT-FM-32) connected to a 32-channel miniature amplifier MPA321.

The side with no screws is considered the top side of the MPA321. If the adapter is oriented as shown in the figure, the FlexMEA36 is inserted with the contact pads facing **downward**.

For connecting the FlexMEA72 you need the adapter ADPT-FM-72. Please see the datasheet FlexMEA72 in the Appendix.

Connecting the FlexMEA36

- The FlexMEA adapter has a drawer for inserting the FlexMEA36. Open the slot of the white drawer. Grip the sides of the white slot cover with your fingers and carefully pull open the slot cover only a little bit (about 1 or 2 mm). Do not demount the cover as the plastic supports might break easily.
- Insert the FlexMEA36 into the slot of the drawer, with the contact pads upside down. Insert the plastic spacer into the slot of the drawer.

Important: Please use a thin plastic spacer between the FlexMEA36 and the connector so that the contact pads make a tight contact to the connector pins. Otherwise, the FlexMEA36 will sit too loose and will have a bad contact resulting in a higher noise level. The spacer should be placed on the opposite side of the contact pads of the FlexMEA36 in the drawer.

- Carefully push back the slot cover of the white drawer until it locks.

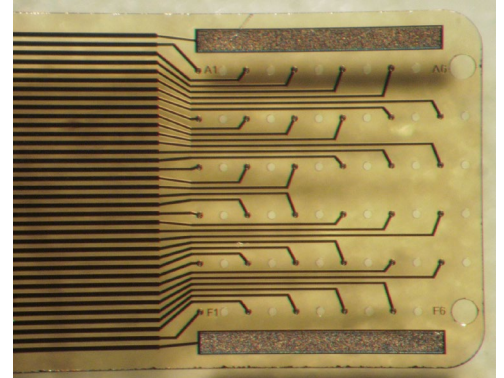
FlexMEAs

FlexMEAs are made of flexible polyimide material (Polyimide 2611 foil), perfect for *in vivo* and special *in vitro* applications. Only 12 μm "thick" and weighing less than 1 g, the FlexMEA biosensor is very thin and lightweight.

FlexMEA36 has 32 titanium nitride (TiN) electrodes plus two internal reference electrodes and two ground electrodes. The flexible base is perforated for a better contact with the surrounding tissue.

The electrodes have a diameter of about 30 μm with an interelectrode distance of 300 μm .

Contact pads and conducting material is pure gold.



FlexMEA72 has 72 titanium nitride (TiN) electrodes plus four internal reference electrodes and four ground electrodes. The flexible base is perforated for a better contact with the surrounding tissue.

The electrodes have a diameter of about 100 μm with an interelectrode distance from 625 to 750 μm .

Contact pads and conducting material is pure gold.



Using FlexMEAs

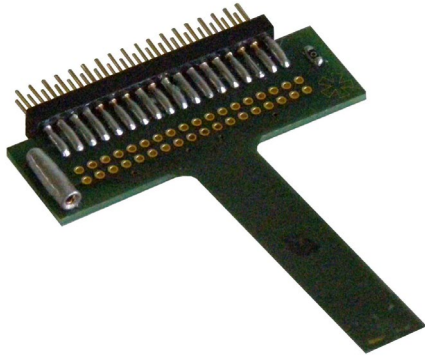
FlexMEAs are usually connected to a headstage preamplifier that is connected to a filter amplifier or programmable gain amplifier (see also the ME-System product line of Multi Channel Systems MCS GmbH). FlexMEAs can be via adapter connected to a 32-channel miniature preamplifier MPA32I from Multi Channel Systems for *in vivo* experiments. FlexMEAs are stable at a temperature range from 10 $^{\circ}\text{C}$ to 40 $^{\circ}\text{C}$.



Warning: Do not autoclave or sterilize FlexMEAs by heat. These MEA types are not heat stable and will irreversibly damaged if the temperature is too high.

Do not use ultrasonic bath for cleaning!

6.1 EcoFlexMEAs



EcoFlexMEAs are made of flexible polyimide material (Kapton), perfect for *in vivo* and special *in vitro* applications. Only 50 μm "thick" and weighing less than 10 g, the EcoFlexMEA biosensor is thin and lightweight.

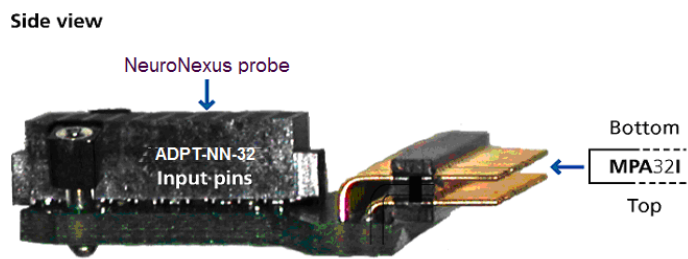
EcoFlexMEA36 has 32 gold electrodes plus two internal reference electrodes and two ground electrodes. The flexible base is perforated for a better contact with the surrounding tissue. The gold electrodes have a diameter of about 50 μm with an interelectrode distance of 300 μm and an impedance of approximately 50 kOhm. Contact pads and conducting material is pure gold.

EcoFlexMEA24 has 24 gold electrodes plus two internal reference electrodes and two ground electrodes. The flexible base is perforated for a better contact with the surrounding tissue. The gold electrodes have a diameter of about 80 μm with an interelectrode distance of 300 μm and an impedance of approximately 50 kOhm. Contact pads and conducting material is pure gold.

Using EcoFlexMEAs

EcoFlexMEAs are usually connected to a headstage preamplifier MPA31I that is connected to a filter amplifier or programmable gain amplifier (see also the ME-System product line of Multi Channel Systems MCS GmbH). EcoFlexMEAs can be directly connected to a 32-channel miniature preamplifier from Multi Channel Systems for *in vivo* experiments. EcoFlexMEAs are stable at a temperature range from 10 $^{\circ}\text{C}$ to 125 $^{\circ}\text{C}$ and can be autoclaved.

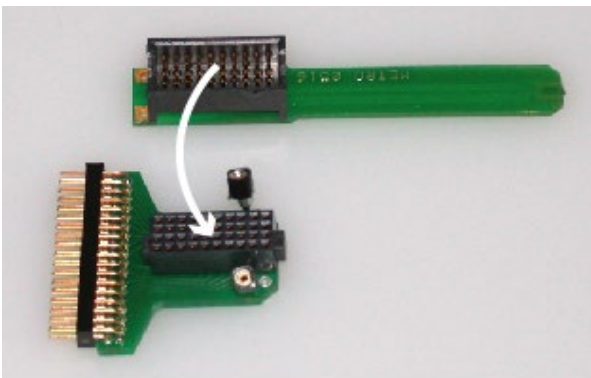
6.1.1 Connecting 32-Channel NeuroNexus Probes



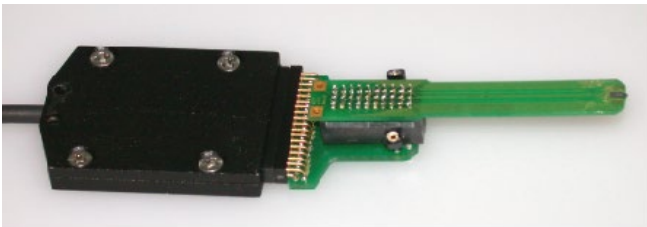
The side with no screws is considered the top side of the MPA321.

Important: REF has to be connected for obtaining a proper signal.

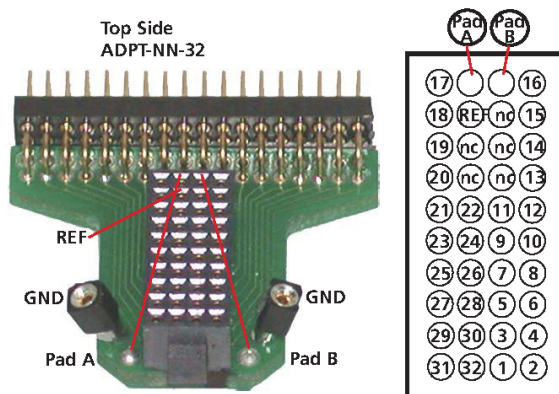
Insert the pin array of the NeuroNexus probe into the black connector of the ADPT-NN-32.



Connect the MPA321 to the adapter outputs. Make sure that the orientation of the MPA321 is correct (see illustration).



6.1.2 Adapter-NN-32 Pin Layout



The indicated numbers are the ME-System channel numbers that will show up in the data acquisition program. GND is the ground, REF is the reference input of the miniature preamplifier and "nc" means not connected.

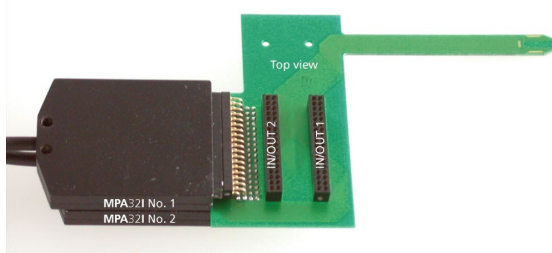
Channel Assignment NeuroNexus Probe to MPA32I and Data Acquisition Program

The following list shows the assignment to the electrode numbers as given by NeuroNexus Technologies

Pin Layout ADPT-NN-32

MPA32I Pin No	Software Channel	ADPT-NN-32 Electrode
1	GND	
2	REF	REF
3	CH 1	EL 17
4	CH 2	EL 21
5	CH 3	EL 18
6	CH 4	EL 23
7	CH 5	EL 19
8	CH 6	EL 25
9	CH 7	EL 20
10	CH 8	EL 27
11	CH 9	EL 29
12	CH 10	EL 31
13	CH 11	EL 32
14	CH 12	EL 30
15	CH 13	EL 28
16	CH 14	EL 26
17	CH 15	EL 24
18	CH 16	EL 22
19	CH 17	EL 1
20	CH 18	EL 3
21	CH 19	EL 2
22	CH 20	EL 5
23	CH 21	EL 4
24	CH 22	EL 7
25	CH 23	EL 6
26	CH 24	EL 9
27	CH 25	EL 8
28	CH 26	EL 13
29	CH 27	EL 11
30	CH 28	EL 14
31	CH 29	EL 10
32	CH 30	EL 15
33	CH 31	EL 12
34	CH 32	EL 16
35	REF	
36	GND	

6.2 Connecting 54-Channel NeuroNexus Probes

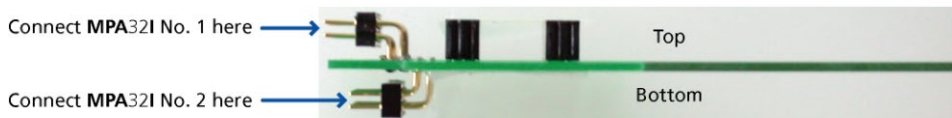


The IN/OUT sockets can be used as output connectors, for connecting single channels to other devices, or as input connectors, for connecting other signal sources.

Important: REF has to be connected for obtaining a proper signal.

Connect the two MPA321 to the ADPT-NN-54 adapter outputs. Make sure that the orientation of the amplifiers is correct (see illustration).

Side view



Important: Connect both MPA321 with the screws face down. Otherwise, the adapter will not work.

ADPT-NN-54 Pin Layout

MPA321 No. 1, IN/OUT 1

<i>1</i>	<i>3</i>	<i>5</i>	<i>7</i>	<i>9</i>	<i>11</i>	<i>13</i>	<i>15</i>	<i>17</i>	<i>19</i>	<i>21</i>	<i>23</i>	<i>25</i>	<i>27</i>	<i>29</i>	<i>31</i>	<i>33</i>	<i>35</i>
GND			12	10	8	6	4	2	27	25	23	15	17	19	21		REF
REF		13	11	9	7	5	3	1	26	24	14	16	18	20	22		GND
<i>2</i>	<i>4</i>	<i>6</i>	<i>8</i>	<i>10</i>	<i>12</i>	<i>14</i>	<i>16</i>	<i>18</i>	<i>20</i>	<i>22</i>	<i>24</i>	<i>26</i>	<i>28</i>	<i>30</i>	<i>32</i>	<i>34</i>	<i>36</i>

MPA321 No. 2, IN/OUT 2

<i>1</i>	<i>3</i>	<i>5</i>	<i>7</i>	<i>9</i>	<i>11</i>	<i>13</i>	<i>15</i>	<i>17</i>	<i>19</i>	<i>21</i>	<i>23</i>	<i>25</i>	<i>27</i>	<i>29</i>	<i>31</i>	<i>33</i>	<i>35</i>
GND		28	29	31	41	39	37	35	33	43	45	47	49	51	53		REF
REF			30	32	40	38	36	34	42	44	46	48	50	52	54		GND
<i>2</i>	<i>4</i>	<i>6</i>	<i>8</i>	<i>10</i>	<i>12</i>	<i>14</i>	<i>16</i>	<i>18</i>	<i>20</i>	<i>22</i>	<i>24</i>	<i>26</i>	<i>28</i>	<i>30</i>	<i>32</i>	<i>34</i>	<i>36</i>

Numbers in italics are the MPA321 pin numbers. The electrode numbers are aligned to the input pins of the MPA321.

The next figure shows the numbering of the polytrode electrodes.

Polytrode: electrode numbers

23	24	25	26	27	28	29	30	31	32
22									33
21									34
20									35
19									36
18									37
17									38
16									39
15									40
14									41
13									42
12									43
11									44
10									45
9									46
8									47
7									48
6									49
5									50
4									51
3									52
2									53
1									54

7 Service and Maintenance

Cleaning the Connectors



Warning: It is recommended to avoid the use of cleaning solutions to avoid corrosion. If a wet cleaning is required, use distilled water. Make sure that only the connectors touch the liquid; do not submerge the miniature preamplifier or the cable. Otherwise, you can fatally damage the electronics.

Clean the connectors with 70 % alcohol and cotton swabs from time to time.

If this does not provide satisfying results, insert only the connectors into a small beaker with acetone or alcohol and treat them in an ultrasonic bath for 10 to 20 s. Air-dry the miniature preamplifier for about 5 min before use.

You can also clean the connectors with distilled water in an ultra sonic bath. Dry the connectors with compressed air immediately after sonication and let the amplifier air dry for at least 6 h before use.

Sterilization



Warning: Do not autoclave or sterilize miniature preamplifiers by high heat (above 70 °C) or vapor. The resin is not heat-stable and may deform under heat. Vapor can lead to a corrosion of the electronics.

Miniature preamplifiers can be sterilized with standard methods that are not based on high heat or vapor, for example, with 70 % ethanol, UV-light, or by thermal sterilization in an oven at 56 °C with an incubation time of 8 hours.

8 Pin Layout

8.1 Power Supply

Supply voltage is applied to the output connector pins 19 and 37. The voltage source should supply a stable noise-free voltage. Do not exceed the maximum voltage.

Pin 19: -3 V to -8 V

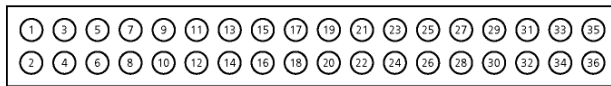
Pin 37: +3 V to +8 V



Warning: Do not mismatch the polarity of the power supply. A false connection may damage the unit.

Input Connector

32-Channel Miniature Preampifier inputs



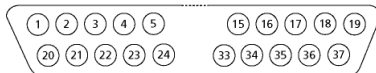
Pin 1: GND (ground)
Pin 2: Reference
Pin 3-34: Channel 1-32
Pin 35: Reference
Pin 36: GND (ground)

This illustration shows the pin layout viewed from the front, with the case screws upside down.

The two reference inputs are used for connecting a reference electrode. Both inputs are equal, so it does not matter which of the two inputs is used. If both are used, the mean of both reference signals is used as reference.

Output Connector

32-Channel Miniature Preampifier outputs

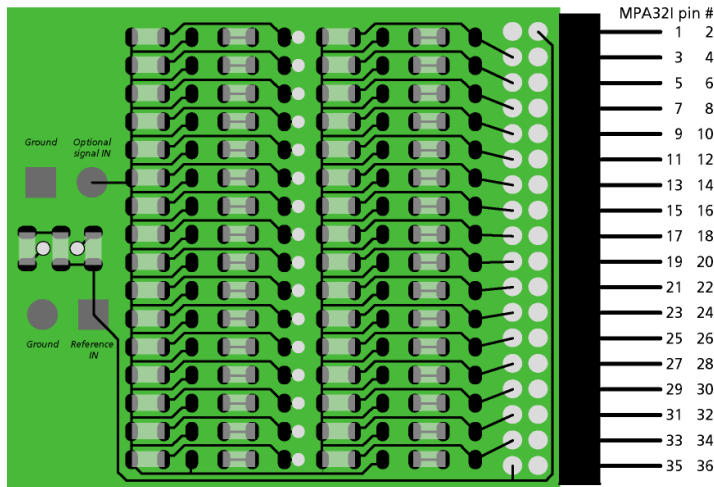


Pin 1:	GNDP (power ground)	Pin 29:	Channel 18
Pin 20:	GND5 (signal ground)	Pin 11:	Channel 19
Pin 2:	Channel 1	Pin 30:	Channel 20
Pin 21:	Channel 2	Pin 12:	Channel 21
Pin 3:	Channel 3	Pin 31:	Channel 22
Pin 22:	Channel 4	Pin 13:	Channel 23
Pin 4:	Channel 5	Pin 32:	Channel 24
Pin 23:	Channel 6	Pin 14:	Channel 25
Pin 5:	Channel 7	Pin 33:	Channel 26
Pin 24:	Channel 8	Pin 15:	Channel 27
Pin 6:	Channel 9	Pin 34:	Channel 28
Pin 25:	Channel 10	Pin 16:	Channel 29
Pin 7:	Channel 11	Pin 35:	Channel 30
Pin 26:	Channel 12	Pin 17:	Channel 31
Pin 8:	Channel 13	Pin 36:	Channel 32
Pin 27:	Channel 14	Pin 18:	GNDP (power ground)
Pin 9:	Channel 15	Pin 37:	Positive supply voltage
Pin 28:	Channel 16	Pin 19:	Negative supply voltage
Pin 10:	Channel 17		

The signal ground is connected to the ground of the amplifier. The signal ground is used as the reference for the following filter amplifier.

8.2 Test Model Probe

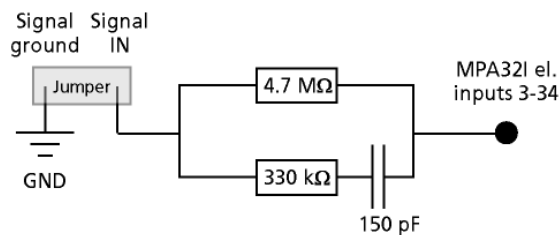
Test model probe for MPA32I - pin layout



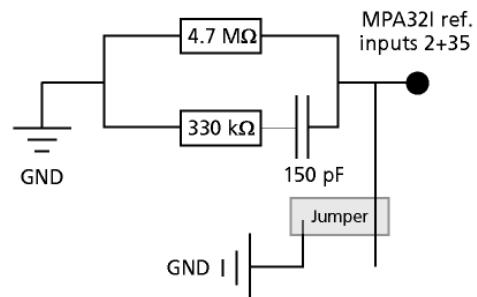
Test signal IN: You can use the jumper to connect the signal input pin (Signal IN) to ground (standard situation for a noise level test), or you can connect a data source, for example, a sine wave generator to the input (and the ground of the test signal to the signal ground input) to test the signal distribution. The input signal is distributed across all recording channels.

Model test probe for MPA - circuit

Test signal input jumper



Reference input jumper



REF I N: The standard situation in an experiment should be that the reference electrode has properties identical or close to the recording electrodes. You can remove the jumper to connect the reference output of the test model probe to the same resistors as the recording channels to mimic the experimental situation, or you can use the jumper to connect the reference output to ground.

DC	4.7 MΩ
Dynamic	330 kΩ
Capacitance	150 pF

9 Contact Information

Local retailer

Please see the list of official MCS distributors on the MCS web site.

Mailing list

If you have subscribed to the ME-System mailing list, you will be automatically informed about new software releases, upcoming events, and other news on the product line. You can subscribe to the list on the contact form of the MCS web site.

www.multichannelsystems.com

10 Technical Specifications MPA32I

Operating temperature	0° C to 50° C
Storage temperature	0° C to 50° C
Relative humidity	10 % to 85 % non-condensing
Dimensions (W x D x H)	27 x 36 x 5 mm
Weight	7 g w/o cable and plug, 56 g with cable and plug
Length of the cable	1.5 m
Maximum tensile strength of cable	20 N
Input connector type	Dual-row precision sockets, 50 mil (1.27 mm) grid pattern, for 0.35 to 0.45 mm round pins
Supply voltage	± 3 V to ± 8 V DC
Supply current	$< \pm 14$ mA, typically ± 9 mA
Number of input channels	32
Input voltage	± 500 mV (with respect to a supply voltage of 5 V)
Input impedance	$10^{12} \Omega$ parallel to 10 pF
Input noise	$< 1.5 \mu V_{RMS}$ (1 Hz to 5 kHz, inputs short-circuited)
Noise density	$e_n = 15 \text{ nV} / \sqrt{\text{Hz}}$
Number of output channels	32
Output voltage	= supply voltage
Output current	max. = 10 mA
Output impedance	0 Ω
Bandwidth	DC to 50 kHz
Gain	10