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About this document

This document describes how to use the BIP2AUX adapter and how it is integrated into a measurement setup. This document forms an integral part of the product. It must be precisely adhered to in order to ensure that the product is used as intended and operated correctly to guarantee the concomitant safety of test subjects, users and third parties. Keep this document in a safe place and make sure that it is always available to the users.

No part of this document may be reproduced or distributed in any form without the express written permission of Brain Products. The operator may print this document to make it available for the users of the product.

Make sure that you have the most recent version of this document for your product or product revision. You can find the most recent version on our website: http://www.brainproducts.com.

Target group of this document

This document is intended for users in the psychological and neurophysiological research area as well as physicians and medical experts with experience in performing physiological data acquisition. Staff must also know how to work safely and reliably with the permitted amplifier and the associated recording software.

Structure of this document

This document is divided into the following chapters:

- **Chapter 1** gives an overview of the main features of the product.
- **Chapter 2** contains the steps you have to do, before you can use the product.
- **Chapter 3** describes how you can use the product and which settings you have to make in the recording software.
- **Chapter 4** contains information on cleaning and maintenance.
- **Chapter 5** contains information on the disposal of the products.
Conventions in this document

Typographical conventions

**Bold**
indicates items on the user interface (menus, buttons, switches, connectors, options) and is used for emphases in the text

*Italic*
indicates titles of dialog boxes/tabs, file locations and is used to indicate product names

**Underscore**
indicates cross-references and web addresses

**Monospaced**
indicates text or characters to be entered at the keyboard

Symbols

Caution: This symbol indicates that incorrect use of the product(s) may result in a personal injury to the test subject, the user and/or a third-party. Failure to observe the information in this document constitutes incorrect use.

Notice: This symbol indicates that the incorrect use of the product(s) may bring about a risk of damage to property.

Note or Tip: This symbol draws your attention to important information relating to the current topic and to recommendations on how to use the product(s).

Cross-reference: This symbol indicates a reference to a related chapter, section or document.

New: This symbol indicates changes or new content at this point.

Revision history

<table>
<thead>
<tr>
<th>Page</th>
<th>Status</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>modified</td>
<td>Product identification (CE marking)</td>
</tr>
</tbody>
</table>
Reporting errors and support

We would ask you to report without delay any error you find in this document, any fault on the products or any malfunction that you observe when using this product. To do so, please contact your local dealer, who will also assist you in general questions about the product.
About this product

The BIP2AUX adapter is intended to expand the use of auxiliary ports (AUX) for the measurement of signals on bioelectricity level. The BIP2AUX adapter is an analog DC-coupled differential amplifier. It is used to connect electrodes for electrophysiological applications, such as electromyography (EMG), electrocardiography (ECG), electrooculography (EOG), electroencephalography (EEG) or electrogastrography (EGG).

## Product identification information

<table>
<thead>
<tr>
<th><strong>Product designation:</strong></th>
<th>BIP2AUX adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Article number:</strong></td>
<td>BP-200-9020</td>
</tr>
<tr>
<td><strong>Manufacturer:</strong></td>
<td>Brain Products GmbH</td>
</tr>
<tr>
<td></td>
<td>Zeppelinstraße 7</td>
</tr>
<tr>
<td></td>
<td>D-82205 Gilching (Munich)</td>
</tr>
<tr>
<td></td>
<td>Phone: +49 8105 73384 - 0</td>
</tr>
<tr>
<td></td>
<td>Fax: +49 8105 73384 - 505</td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://www.brainproducts.com">http://www.brainproducts.com</a></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:techsup@brainproducts.com">techsup@brainproducts.com</a></td>
</tr>
</tbody>
</table>

### CE marking


### Warranty

[http://brainproducts.com/contact.php](http://brainproducts.com/contact.php)
Combination with other products

The BIP2AUX adapter is permitted to be combined with the following products:

<table>
<thead>
<tr>
<th>Product name</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-Amp</td>
<td>Brain Products GmbH</td>
</tr>
<tr>
<td>actiCHamp</td>
<td>Brain Products GmbH</td>
</tr>
<tr>
<td>BrainAmp ExG / BrainAmp ExG MR^a</td>
<td>Brain Products GmbH</td>
</tr>
<tr>
<td>StimTrak</td>
<td>Brain Products GmbH</td>
</tr>
<tr>
<td>Passive Ag/AgCl electrodes (e.g. Multitrodes)</td>
<td>Brain Products GmbH (others on request)</td>
</tr>
<tr>
<td>BrainVision Recorder (recording software)</td>
<td>Brain Products GmbH</td>
</tr>
<tr>
<td>BrainVision PyCorder (recording software)</td>
<td>Brain Products GmbH</td>
</tr>
</tbody>
</table>

a. Only if used in laboratory environment.

In addition to this general overview of the permitted combinations, users must also check that all the conditions applicable to the product in question are fulfilled for the specific combination and specific application (definition of purpose and intended use).

If users combine products other than those listed here then they are responsible for ensuring the safety of test subjects, operating personnel and the environment. If the product data does not immediately make it clear that products can be combined (connected) without danger then the user must contact the relevant manufacturers to ensure that the required safety of all the products involved is not compromised by the intended connection.
Markings on the product

MR unsafe: Products with this symbol are not safe for use in an MR environment.

Adhere to the manual.

With this symbol the manufacturer confirms the electromagnetic compatibility (EMC) of this product.

Next to this symbol, the name and address of the product manufacturer is specified.

Safety information

Please read the following safety information carefully since it helps to prevent personal injury and damage to property. It is assumed that you have the required specialist knowledge in handling the product and accessories.

Brain Products will not accept any liability for loss or damage resulting from a failure to follow these operating instructions and, in particular, the safety instructions.

Intended use

The BIP2AUX adapter is intended to be used for acquiring neuro-/electrophysiological signals (e.g. EEG, EMG, ECG, EOG or signals from other approved sensors) in the context of non-medical applications in order to carry out fundamental or applied research on the basis of neurophysiological methodology and data.

The BIP2AUX adapter is not a medical device. Use for diagnosis, therapy, monitoring of vital physiological processes (e.g. cardiovascular functions) or other medical purposes is expressly forbidden.

Correct use

The BIP2AUX adapter must only be used:

- by trained persons in the psychological and neurophysiological research area as well as physicians and medical experts for non-medical applications.
- in hospitals, clinics, other medical environments, research institutes and other non-medical environments (e.g. at home), provided that all the other stipulations regarding the correct use are met and that the products are used in accordance with their intended use.
- for healthy and sick adults, children and animals.

The BIP2AUX adapter **must not be used**:

- by unqualified persons, persons who cannot read or understand the manual.
- in the vicinity of explosive gases (for example in operating theaters).
- in oxygen enriched atmospheres.
- under water or in environments in which significant amounts of water can enter the product.
Irrespective of any liability on the part of the manufacturer, the relevant national stipulations for op-
erators and other relevant national legislation must be observed.

The user is solely liable for any risks to subjects associated with the investigation, if the product is
not used in accordance with the correct use described.

**CAUTION**

*Risks of electric shock*

The BIP2AUX adapter has no galvanic isolation. If you connect it to an AUX input of an
amplifier while other equipment that has no galvanic isolation is connected to anoth-
er AUX input of the amplifier, there is a risk that the test subject may receive an elec-
tric shock.

Do not connect a BIP2AUX adapter and at the same time equipment that is not suffi-
ciently isolated against dangerous electric currents to the auxiliary inputs of an am-
plifier (EN 60601-1, 3rd edition).

**NOTICE**

*Risk of breaking the connector*

The connector of the BIP2AUX adapter has a latch. Disconnect the adapter by pulling
on the connector.

Do not turn the connector or pull on the cable.

**Damage of the BIP2AUX adapter when using a defibrillator**

The BIP2AUX adapter is not protected against electrical discharges of a defibrillator. Discon-
nect the BIP2AUX adapter before using a defibrillator, to avoid damaging the
adapter.
NOTE

General precautions

► Handle the product and its accessories with care.
► No liquids must penetrate the products.
► Do not drop the product or allow it to fall.
► Avoid impacts on the product.
► Heat, direct sunlight (UV radiation), moisture, dust, liquids, conductive foreign matter and excessive radiation can shorten the lifetime of the product.
► Use the supplied cables. Brain Products is not liable for damage caused by cables that are not supplied by Brain Products.
► Do not unplug connectors by pulling on their cable. Instead unplug a connector by pulling on the connector itself.
► Do not crush or kink the cables.

Note on the data quality

Do not operate within three meters of an operating cellular phone, similar radio transmitting device, other powerful radio interference producing sources such as arc welders, radio thermal treatment equipment, x-ray machines, or any other equipment that produces electrical sparks.
Chapter 1  Overview of the product

Make yourself familiar with the product before using it for the first time.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minus electrode input, white, 1.5-mm safety socket (DIN 42802)</td>
</tr>
<tr>
<td>2</td>
<td>Ground electrode input, black, 1.5-mm safety socket (DIN 42802)</td>
</tr>
<tr>
<td>3</td>
<td>Plus electrode input, white, 1.5-mm safety socket (DIN 42802)</td>
</tr>
<tr>
<td>4</td>
<td>Auxiliary connector</td>
</tr>
</tbody>
</table>

The BIP2AUX adapter is supplied with power through the auxiliary connector of the amplifier or StimTrak. It has no on/off switch.
Chapter 2  Before you begin

2.1  Check the scope of delivery

Upon receipt of the delivery make sure, that the product or package does not show any signs of damage. Contact your local dealer, if the delivery is incomplete.

The components listed below are included in the scope of delivery.

- BIP2AUX adapter
- Application Suite DVD
- Electrodes (optional)

2.2  Place the electrodes on the subject

Before you start, place the electrodes on the subject according to your research scheme.

For better contact with the skin, use a conductive gel or paste as used for the EEG, EOG, EMG and ECG acquisition.

Detailed instructions on how to prepare the electrodes are provided by your dealer or the manufacturer of the electrodes.
Chapter 3 Using the product

3.1 Connect the electrodes to the BIP2AUX adapter

Prepare
- BIP2AUX adapter
- three electrodes with touch-proof plugs

Connect the electrodes to the sockets of the BIP2AUX adapter.

Note: The operator must be familiar with the typical characteristics of signals acquired by the BIP2AUX adapter.

→ The plus and minus electrodes are connected to the white sockets, and the ground electrode to the black socket.
### 3.2 Connect the BIP2AUX adapter to a signal input

You connect the BIP2AUX adapter to the auxiliary input of the amplifier or of StimTrak.

**Prepare**
- Amplifier with auxiliary input or StimTrak.

Connect the BIP2AUX adapter to the auxiliary input.

⇒ The BIP2AUX adapter is supplied with power via this connection.

### 3.3 Use one BIP2AUX adapter

**Prepare**
- BIP2AUX adapter
- three electrodes
- amplifier or StimTrak

1. Prepare the electrodes on the test subject.

2. Connect the electrodes to the BIP2AUX adapter.

3. Connect the BIP2AUX adapter to the auxiliary input of the amplifier or the signal input of StimTrak.

⇒ Enter settings in the recording software (see Section 3.5).
3.4 Use two or more BIP2AUX adapters

You can use several BIP2AUX adapters to measure electrophysiological signals at the same time.

Note: Only connect one ground electrode, even if you use two or more BIP2AUX adapters on a subject. This is because, the auxiliary channels have a common ground.

Prepare
- BIP2AUX adapters
- electrodes
- amplifier or StimTraks

1. Connect the negative, positive and ground electrode to the first BIP2AUX adapter.

2. Connect the negative and positive electrode to the second BIP2AUX adapter.

3. Connect the BIP2AUX adapters to the auxiliary inputs of the amplifier or the signal input of the StimTrak.

⇒ Enter settings in the recording software (see Section 3.5).
3.5 **Enter settings in the recording software**

**Recorder**

1. Open a workspace.
2. In the workspace wizard, select the auxiliary channel to which the BIP2AUX adapter is connected.
3. Enter the following settings:
   - **Diff. Unit**: select
   - **Unit**: μV
   - **Gradient**: 0.1
   - **Offset**: 0

These settings account for the gain factor 100 of the BIP2AUX adapters.

![Channel Settings Table]

Repeat the procedure as of step 2 to add more BIP2AUX adapters.
**PyCorder**

1. Open PyCorder, click on the button **Configuration**...
2. In the tab **Amplifier**, select **BIP2AUX** and then click on the add button.
3. Follow the prompts on the screen.

Repeat the procedure as of step 2 to add more BIP2AUX adapters (max. eight).
4.1 Clean the electrodes

Damage of the electrode material and electrode cables

Chlorination and hot sterilization methods (for example, autoclave) damage the electrode material.

Do not use other cleaning agents as recommended by the manufacturer of the electrodes. Clean the electrodes preferably under running water.

Clean the electrodes immediately after use.
1. Unplug the electrodes from the BIP2AUX adapter.
2. Clean the electrodes under running water using a toothbrush.
   - Use a cleaning agent based on alcohol (adhere to the cleaning instructions of the manufacturer) to remove grease residuals.
   - Connectors must not come into contact with moisture. Moisture causes corrosion.
3. If the water in your region is hard, rinse the electrodes in distilled water.
4. Dry the electrodes gently by wrapping them in a towel. Any residual dampness can dry in the air.

Note

A brown oxidation film can form on the electrode material of inadequately cleaned or rarely used electrodes. Carefully brush or rub the film off using a non-metallic material (abrasive paste, fine emery paper). Then clean the electrodes as described.
4.2 Clean the BIP2AUX adapter

**CAUTION**

**Hazard of electrical shock**

Do not clean the product while it is connected to the test subject or power supply. Cleaning liquid could cause a short circuit resulting in an electrical shock.

Before cleaning, disconnect all cable connections.

**NOTICE**

**Damage to the BIP2AUX adapter during cleaning**

- Do not clean under running water.
- Do not use aggressive or corrosive cleaning agents.
- Do not sterilize the products.

Clean the BIP2AUX adapter immediately after use.

1. Unplug the electrodes from the BIP2AUX adapter.
2. Use a soft, slightly moist cloth for cleaning.
   - For disinfecting the surfaces of the products, we recommend to use a cleaning agent based on propylalcohol, for example a solution containing 25 % Ethanol and 35 % Propan-1-ol. Adhere to the safety precautions of the manufacturer of the cleaning agent.
   - Connectors must not come into contact with moisture. Moisture causes corrosion.
3. Wipe off any moisture from the adapter after cleaning. Any residual dampness can dry in the air.

4.3 Store the BIP2AUX adapter

Store the BIP2AUX adapter and the electrodes on a dry and dark place.

- Do not expose to direct sunlight.
- Do not store the electrodes in disinfectant.

4.4 Maintenance information

The BIP2AUX adapter is free of maintenance.
Dispose of the product in accordance with the relevant national regulations, when the product, accessories and cables have reached the end of their service life.

In the EU and EFTA, the WEEE Directive 2002/96/EC on Waste Electrical and Electronic Equipment applies. In Germany, for example, the legislation governing electrical and electronic equipment (known as the ElektroG) is applicable.

Do not dispose of your product, accessories and cables with ordinary household waste.

Subject to the proviso that only original equipment supplied by Brain Products is involved, Brain Products will accept return of the equipment and handle disposal on request.
## Appendix A  Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of channels</td>
<td>1 differential for EMG / ECG / EEG acquisition</td>
</tr>
<tr>
<td>Power supply</td>
<td>±3 V to ±5 V, max. 1 mA</td>
</tr>
<tr>
<td>Input range</td>
<td>±50 mV</td>
</tr>
</tbody>
</table>
| Output range               | Negative supply voltage +0.2 V to positive supply voltage -0.2 V  
Virtual ground: 0 V output for 0 mV input                                         |
| Differential impedance     | > 200 MOhm at DC                                                                                                                      |
| Analog gain                | 100 ±3 %                                                                                                                              |
| Frequency range            | 0 to 3,000 kHz (-3 dB)                                                                                                               |
| Noise                      | Less than 3 μV peak-peak for 0.05 to 70 Hz band                                                                                      |
| Electrode sockets          | Two differential inputs (white) and one virtual ground (black).  
1.5-mm touch-proof connectors (DIN 42802).                                         |
| Auxiliary connector        | 1  Positive supply voltage (+3 V to +5 V)  
2  +Signal output  
3  Ground  
4  -Signal out  
5  Negative supply voltage (-3 V to -5 V)                                         |
| Dimensions                 | 35 x 35 x 15 mm                                                                                                                       |
| Weight with cables         | approx. 25 g                                                                                                                          |
| Connecting cable           | approx. 0.5 m                                                                                                                         |
### Operating
- Temperature: 0 °C to 40 °C (32 °F to 104 °F)
- Relative humidity: 30 % to 85 %, non-condensing
- Atmospheric pressure: 700 hPa to 1,050 hPa

### Storage
- Temperature: 5 °C to 40 °C (41 °F to 104 °F)
- Relative humidity: 30 % to 85 %, non-condensing
- Atmospheric pressure: 700 hPa to 1,050 hPa

### Transport
- Temperature: -35 °C to 65 °C (-31 °F to 149 °F)
- Relative humidity: 30 % to 85 %, non-condensing
- Atmospheric pressure: 700 hPa to 1,050 hPa