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# BrainAccess HALO

## Version 2.0

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User's Manual  
May, 2024

### Introduction

Welcome to the user's manual of BrainAccess HALO – an EEG (electroencephalography) headband. It overviews the main features and specifications of the device and guides you through the set-up procedure. Should you have any further questions not covered in this guide please visit [www.brainaccess.ai](http://www.brainaccess.ai) where you can find more information or contact us at [brainaccess@neurotechnology.com](mailto:brainaccess@neurotechnology.com).

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## I Features

**Extremely portable.** BrainAccess HALO integrates a full EEG acquisition system (electrodes, electroencephalograph, battery and Bluetooth transceiver) while maintaining a small form factor making it a truly portable device.

**Dry-contact electrodes.** The device features dry-contact electrodes and therefore no conductive gel is needed for EEG measurements. The electrodes are gold-plated ensuring their long operation life-time. The electrodes positioned at the back of the head have spring-loaded spikes that ensure good penetration through hair and good comfort.

**Superior comfort.** BrainAccess HALO is an extremely light and semi-flexible headband that adapts well to the curvature of the head ensuring comfortable wear even for extended periods of time.

**One size fits all.** The size of the band can be easily adjusted and can fit most of the adult head sizes. The band and electrodes themselves are flexible ensuring good electrode contact for different head shapes.

**High-quality EEG signals.** Shielding, the use of active ground and the fact that the whole measurement system is integrated into the band – all help minimizing the effects of external noise sources on EEG recordings.

**Long operating times.** The HALO is equipped with a high-capacity battery, which ensures long operation times and up to 9 hours of continuous data streaming before the need of charging.

## 2 Package Contents

You will find 3 items in the package:

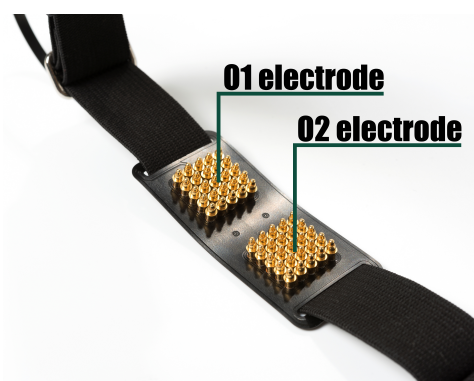
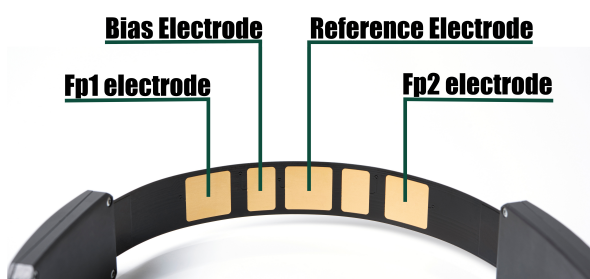
- BrainAccess HALO EEG headband.
- USB Bluetooth 4.2 adapter, which is used to communicate and stream data to computer from BrainAccess HALO. Alternatively, a different Bluetooth adapter such as an integrated Bluetooth adapter in a laptop may be used instead.
- USB-C charger cable.

## 3 Electrode Positions

BrainAccess HALO is a 4-channel electroencephalograph with a common reference channel. An overview of the electrodes and their placements are given below.

**Reference electrode.** Reference electrode is positioned in the middle of the frontal part of the band. The measurements on all the electrodes are made with respect to this electrode. The reference electrode should be placed at the centre of the forehead to ensure symmetrical measurements between brain hemispheres.

**Bias electrode.** Bias electrode can be considered as an active ground electrode. Signals recorded by any electrode can be inverted and routed to bias electrode. This bias-feedback approach helps reducing the common mode noise such as noise from grid electricity. The electrodes used for bias-feedback can be selected in software.



**Fp1 and Fp2 electrodes.** There are two frontal electrodes with golden pads as well, placed approximately at Fp1 and Fp2 locations.

**O1 and O2 electrodes.** There are two electrodes on the back part of the headband. Each electrode has 25 soft spring-loaded gold-plated spikes that help penetrating the hair. The electrode positions roughly correspond to O1 and O2 locations. When wearing the band, make sure that these electrodes are centered around occipital region.

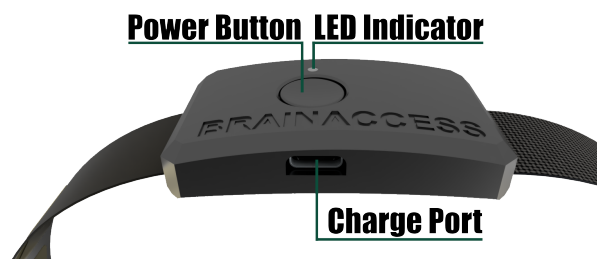
## 4 Controls and Indicators

The minimalistic user interface for the BrainAccess HALO is located on the left side box.

**Power button.** Press and hold a power button for a couple of seconds to turn the device on/off. The device will vibrate to indicate turn on/off. The blue LED will start breathing once the device is on.

**Charging port.** The device's battery can be charged via USB-C port using standard 5V chargers such as mobile phone chargers. The charger should be capable of providing at least 800 mA of current. The charger cable is included. Note that the device cannot be used while charging.

**LED indicator.** The breathing blue light indicates that the device is turned on. If a Bluetooth connection is established between a computer and the device it turns solid blue. When the battery level drops below 15% the red light fast-blinks a couple of times on each 1% drop. When the device is charging, the red light is fading-in. Once fully charged the red light turns off.



## 5 Set-up

Follow the steps below to get start using the BrainAccess HALO.

- Press the power button and hold it for a couple of seconds. The device should vibrate and a blue LED should start breathing indicating that BrainAccess HALO has turned on.
- If a red LED fast-blinks when turning on the device and the device does not turn on, it indicates that battery is low. Please charge the device first.
- Plug in the provided Bluetooth adapter to your computer, the drivers should install automatically. Skip this step if using an integrated or some other installed Bluetooth adapter.
- If you haven't done this already, download the BrainAccess Board application. The software can be downloaded from the download centre at <https://www.brainaccess.ai/resources/download>.
- Launch the BrainAccess Board, connect to the HALO device using Configurator and start the stream. On successfull connection a device tab should be added to the connected devices list. You can open an EEG viewer from there to confirm that data is being streamed.
- Put the headband on. Firstly, put the frontal part of the band on the the forehead, then pull the back part of the band to extend it, lower it into position and release. If it is too tight or too loose, use the adjustment mechanism to lengthen or shorten the elastic band. Make sure that frontal electrodes are positioned so that the reference electrode is at the centre of the forehead and back electrodes are placed over occipital cortex region.

Remember to clean the electrodes from time to time with a disinfection wipes to remove bacteria and grease.

Visit <https://www.brainaccess.ai/tutorials/> for additional information and tutorials.



## 6 Specifications

Main specifications of BrainAccess HALO EEG headband are given in the table below.

Connectivity	
type	Bluetooth 4.2
range	up to 15m (using the provided Bluetooth adapter)
EEG data	
number of channels	4 with a common reference channel
sampling frequency	250 Hz
input resolution	24 bits
analog gain values	1, 2, 4, 6, 12, 24
input voltage range	4500 mV / gain value (w.r.t. reference channel)
Battery	
type	Li-Po
capacity	550 mAh
operating time	up to 9 hours (continuous streaming)
charging time	2 hours
charger input	5V 800 mA min (charger not included)
charger connector	USB-C
Mechanical	
mass	70 g
perimeter	53-58 cm

Table 1: Specifications of BrainAccess HALO.

## 7 Safety Notice

BrainAccess HALO EEG headband will be referred as 'the device' in this safety notice.

- Do not use the device outside in rainy/snowy conditions.
- Do not use the device near the water or in extremely damp conditions.
- Do not use the device in an explosive atmosphere.
- Do not connect any electrical power sources or other electrical equipment to the device's electrodes.
- Do not wear the device while charging. The device will not stream any data while charging.
- Do not use the device with suspected failures. In cases such as, but not limited to, the device does not operate as expected, physical damage is visible on the casing, the device was dropped into the water/snow, the device was dropped from substantial height, other objects has been dropped on the device, liquid has been spilled on the device, have the device inspected by qualified personnel before further operation.
- The device should be serviced by authorized personnel only.

## 8 Warranty

Neurotechnology ltd. warrants this product (BrainAccess HALO EEG headband) against defects in materials and workmanship for one (1) year from purchase date under normal consumer use conditions. If the product fails during normal and proper use within the warranty period, Neurotechnology will repair or replace the product. The liability of Neurotechnology does not include any incidental or consequential damages.

This warranty does not include failure caused by improper set-up, operation, maintenance, accident, damage, misuse, modifications not approved by Neurotechnology, normal wear and tear, any event or act outside Neurotechnology's control.

This warranty does not apply if serial number of the product has been altered or removed, the casing of the product has been opened or the product has been tampered or repaired by unauthorized personnel.

## 9 Support

Please contact Neurotechnology if you have any problems using any of the BrainAccess products.

**Neurotechnology ltd.**

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