

# Muse 2



## A) Introduction

From:

<https://github.com/RealityBending/SussexPhysioProtocol/blob/main/EEG.md#equipment-details>

The Muse 2 headset is a reliable and versatile tool for gathering EEG (Electroencephalography) and other physiological data. With its high-quality sensors, researchers can capture and analyse electrical brain activity in real-time or record and store to analyse later. It offers a lightweight and comfortable design for participants, facilitating non-intrusive and longer data collection sessions. Using two electrodes on the front headband of the device as well as two behind the ear sensors, the Muse 2 headset can record EEG data from the frontal and temporal lobes. On top of its EEG capabilities, the headband tracks heart rate (PPG + Pulse Oximetry), angular velocity (gyroscope), proper acceleration (accelerometer) making this lightweight headset a powerful tool for gathering a range of physiological data without a lengthy setup or making the participant feel uncomfortable with multiple intrusive sensors. The Muse 2 headset has potential uses in various research applications, including cognitive neuroscience, neurofeedback, meditation research, and sleep studies.

## B) Starter Guide

Based on the original website: <https://choosemuse.com/blogs/news/muse-2-starter-guide>

## Turn On Your Device

To turn on your headband, click the small button next to the charging port on your Muse pod. You'll know it's on when you see blue cascading lights moving back and forth as Muse looks to connect via Bluetooth to your mobile device.

## Check Your Battery Life

To check the charge level of your Muse click the power button one more time after the headband has been turned on and it will indicate how charged the headband is by the number of lights that are full. If only one or two are lit up, it may be time to charge. Whereas three lights indicate a full charge.

## How to Fit Your Muse

To correctly fit your Muse 2, gently extend the adjustable earpieces while being mindful not to extend further once you feel tension. Overextension can lead to internal damage in your Muse device. Your headband should be extended so that it is slightly larger than your head size before adjusting it on your head.

Place your Muse along the middle of your forehead with the rubber ear sensors resting behind your ears. The earpieces should sit behind your ears just as a pair of glasses would. Adjust both sides simultaneously to tighten it back up for a snug fit that feels comfortable. Both earpieces should be equally extended to ensure there are no gaps and that all sensors have good skin-to-sensor contact. The headband should run across the middle of your forehead – not too high (near your hairline) or too low (near your eyebrows.)

Make sure that there is no hair between the sensors and your skin, as this can prevent Muse from getting a good signal. Move any hair from above or behind your ears as you adjust the fit for the best results. If you have long hair we recommend tying it up.

You may need to adjust your Muse headband a few times to obtain the best fit and most consistent signal quality. Please pause for 30-60 seconds after making any adjustments to allow the signal to settle. In time, you'll find the fit that's right for you and this step will become second nature before you start a meditation session.

When you have finished your session, store your Muse device in a Muse hard case or the original box that it came in to help preserve your device for years to come.

The band should sit snug and comfortable around your head.

Watch the video to learn how to properly fit your Muse S device:

## How to Get Good Signal Quality

If you're having difficulty getting a good signal quality there are a couple of different ways to remedy this.

1. Apply a damp tissue or cloth (moistened with water) to the Muse sensors. Give them a gentle wipe to assist contact of the sensors with your skin.
2. Or use the damp cloth or tissue and run across your forehead and behind the ears to improve sensor connection. You can also take a damp cloth to your forehead and behind your ears to improve signal quality.

## **C) EEG and EEG recording**

EEG (Electroencephalography) is a method of recording electrical activity in the brain, providing an electrogram representation of brain waves. This is achieved by placing electrodes around the head to measure electrical conductance. In our study, we will be using electrodes on the forehead and behind the ears to capture the electrogram from two different sites. In some cases, a slightly damp cloth may be used to increase conductance and improve the quality of the recorded data.

To measure EEG, we will utilize the Muse 2 headset. Although this headset is commercially available for meditation purposes, it will be used exclusively for research in our study. Therefore, we will not be able to provide feedback or information on clinical aspects of the data obtained. The Muse 2 headset is lightweight and non-intrusive, ensuring a comfortable experience during the recording session. If you have long hair, we recommend bringing a hairband to ensure unobstructed contact between the electrodes and your skin.

Electroencephalography (EEG) will be conducted using the Muse 2 headset, a lightweight and non-intrusive device. The headset is designed to be worn comfortably behind the ears and on the forehead, utilizing four electrodes to capture electrical signals from the brain's temporal and frontal lobes. Specifically, the four channels (TP9, TP19, AF7, and AF8) will be recorded using dry electrodes placed at these sites.

The Muse 2 headset is a commercially available device commonly used for capturing meditation biomarkers, and it poses no risk or harm to the participants. It employs non-invasive dry electrodes, ensuring a safe and comfortable data collection experience. In rare instances where the received signal is too weak to be useful, researchers may enhance skin conductance by gently rubbing a slightly damp cloth across the forehead and behind the ears. However, this step is typically unnecessary and, if needed, can be performed by the participants themselves.

Following data collection, the researcher will collect the Muse 2 headset and sanitize it appropriately before its subsequent use. These measures ensure the maintenance of hygiene standards and the participants' well-being throughout the research process.