



NeuroNexus

Reduce Noise in Recording System

Asiyeh Golabchi (PhD)

Updated 12/20/2023



Table of Contents

Table of Contents	2
Recommendations for Reducing Noise in Electrophysiology Setup	3

Recommendations for Reducing Noise in Electrophysiology Setup

One of the most common noise issues in electrophysiology setups is the presence of 50 Hz (Europe) or 60 Hz (US) 'ground' noise. This can be mitigated by ensuring proper grounding of the equipment, thereby avoiding ground loops between instruments. Higher frequency noise may originate from various sources such as the computer, monitor, room lights, digital oscilloscope, or instrument power supplies.

To address these noise concerns, it is crucial to connect all equipment to the same ground, as different sockets may not have precisely the same voltage level. Starting from a single wall socket, connect a power strip to ground all the equipment. Experiment with each suggested method individually or in combination to achieve the desired noise level. While these methods can help capture a clean signal with minimal noise, it's important to note that each setup is unique and may present distinct noise challenges.

If noise issues persist, it is recommended to contact support@neuronexus.com for further assistance. Additionally, implementing a heavy, grounded metal plate on the bottom of the Faraday cage can help contain ambient noise in the recording setup. Connect the Faraday cage, microscope, stereotaxic frame, manipulator, etc., to the ground metal plate using heavy gauge wires. Attach a single wire from the plate to the best possible main ground.

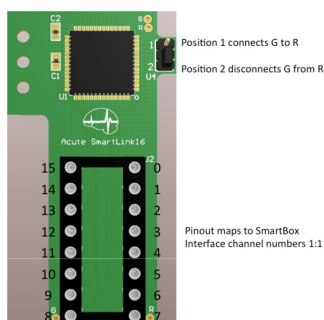
Perform the following checks and actions:

- Confirm if your Faraday cage is properly grounded.
- Verify if your SmartBox Pro is grounded.
- If the animal is in the stereotaxic frame during recording, add extra alligator clips from the stereotaxic frame to the Faraday cage.
- Turn off the camera or light on top of the microscope.
- Check the microscope earth connection.
- Turn off any high-power machines close to your recording setup.
- Unplug all other devices except from the main outlets.

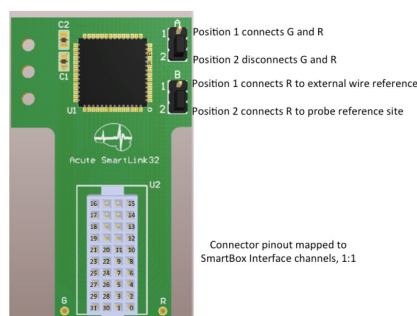
- Add an extra needle as a probe grounding wire to the nuchal musculature, and using alligator clips, attach the needle to the Faraday cage.
- Check for thermal noise from the headstage, especially if the recording setup has been used continuously for an entire day.

If the noise issue persists, consider changing the ground and referencing on the headstage. Smartlink headstages are designed with jumpers to provide flexibility in achieving the cleanest signal possible. Jumper A is related to headstage referencing and grounding level, while jumper B is for referencing the probe level. Adjusting these jumpers may help improve the signal quality.

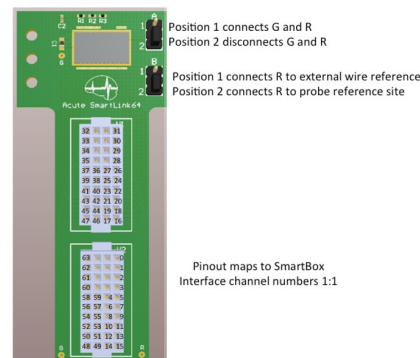
Acute SmartLink 16



Acute SmartLink 32

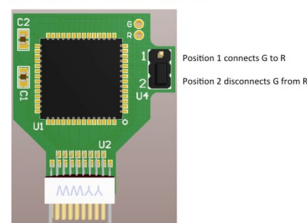


Acute SmartLink 64

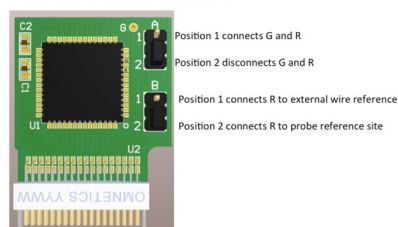


Smartlink headstages are designed with jumpers to offer users flexibility in obtaining the cleanest signal possible. Jumper A is associated with the headstage referencing and grounding level, while jumper B is used for referencing the probe level. These jumpers allow for adjustments that can enhance the quality of the recorded neural signals.

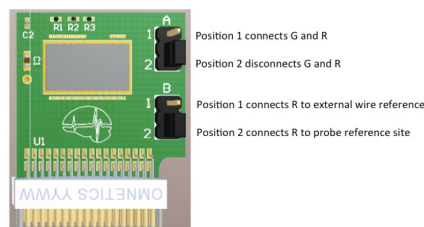
Chronic SmartLink 16



Chronic SmartLink 32



Chronic SmartLink 64



- In the default configuration, Jumper A is set to position 2, aiming to provide the lowest noise level. In this setup, it is recommended to add two separate bone screws to the skull and



connect the reference and ground wires to them individually.

- Regarding Jumper B, many customers find position 2 preferable, especially when using electrodes with a large reference site on the probe shank. However, if an external reference is desired, switch Jumper B from position 2 to position 1. This adjustment allows users to tailor the headstage configuration based on their specific needs and electrode characteristics.