NeuroNexus

Vector Array™

User Manual

Updated April 25, 2023

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PLEASE READ

NeuroNexus is committed to designing and producing cutting-edge neuroscience devices. We welcome your feedback to improve the Vector Array™.

- Care should be taken when handling and inserting the Vector Array™. Only handle the Vector Array™ by holding the manipulator bar, and insert the Vector Array™ using a guidetube.
- If you plan on stimulating with the Vector Array™, please note that the electrode sites are iridium. Optimally, iridium sites should be activated immediately prior to use. The upper limit of charge density for iridium oxide is 3 mC/cm^2* biphasic cathodic-first current pulse. (*With 1 ms per phase and a 100 µs inter-phase delay)
- A 2.5" Omnetics jumper cable/adaptor is available for purchase. This allows the headstage to be anchored, relieving the strain on the electrode.
- Vector Arrays™ are currently available in two designs, Edge and Poly2 (see next page). Vector Arrays™ can be tuned to reach different targets, to improve selectivity, to record LFPs, or to increase stimulation level by adjusting the electrode site surface area or layout. Contact us for details on customization.

*X. Beebe and T. L. Rose, Charge Injection Limits of Activated Iridium Oxide Electrodes with 0.2 ms Pulses in Bicarbonate Buffered Saline, IEEE Tran Biomed Eng. vol 35, 494-495 (1988)

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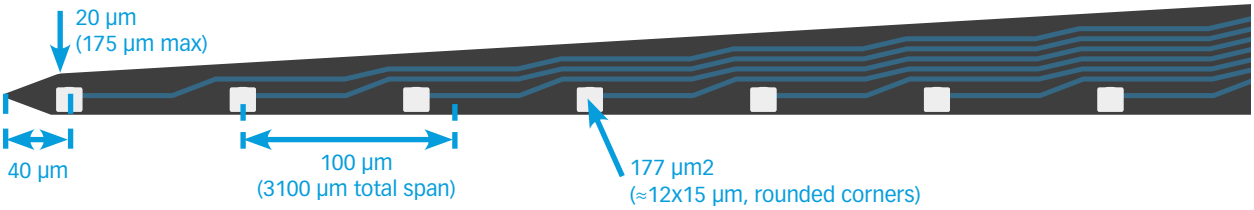
Vector Array™

The Vector Array™ is an all-new probe design optimized for large animal deep brain applications (e.g. non-human primate, porcine, etc.). The probe design is completely overhauled to fully take advantage of our industry-leading silicon probe technology.

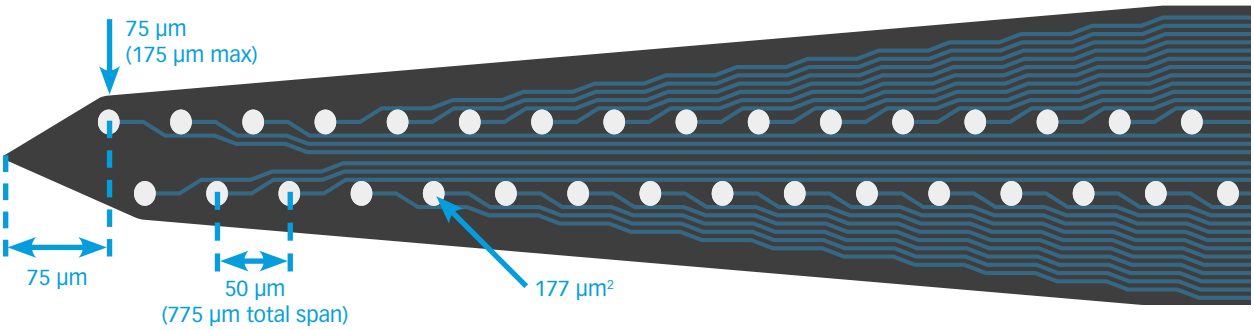
Contact us to customize a design.

Available Designs

V1x32-Edge-15mm-100-177



V1x32-Poly2-15mm-50s-177



SPECIFICATIONS	
Number of Channels	**32**
Implantable Length	**80 mm (15 mm electrode array + 65 mm support body)**
Electrode Array Width	**50 µm (min), 175 µm (max)**
Electrode Array Length	**15 mm**
Site Coverage	**3100 µm (Edge), 775 µm (Poly2)**
Site Area	**177 µm²**
Manipulator Bar	**0.711mm OD (Stainless Steel or Tungsten), 50mm length**
Support Body Diameter	**419 µm OD (Stainless steel)**

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Storage Precautions

Store at room temperature (-34°C/-29°F to 57°C/135°F).

For long-term storage:

Do not expose to temperatures below -39°C/-29°F or above 70°C/158°F. Maintain relative humidity between 10% and 100% (do not allow condensation). Maintain atmospheric pressure between 500 hPa and 1060 hPa.

Intended Use

The Vector Array™ is used for recording extracellular neural activity, or electrical microstimulation in acute or chronic animal preparations. **It is not approved for use in human applications.**

Components

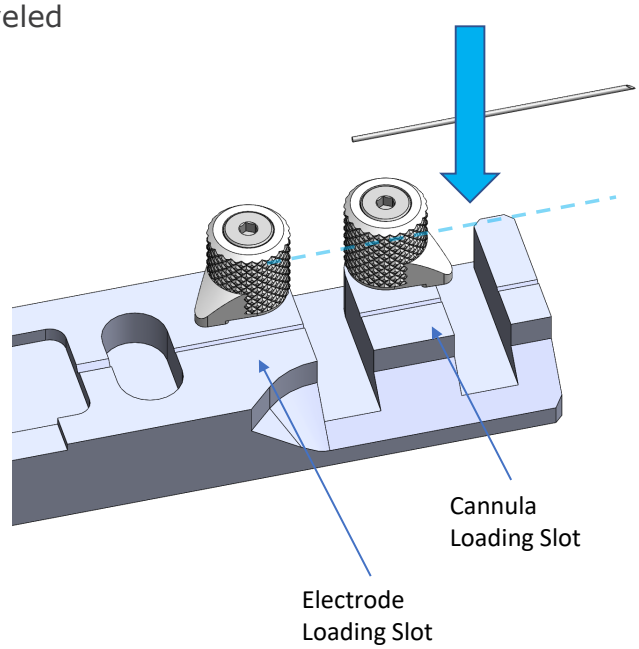
Guidetube

Use of a guidetube for insertion can prolong the life of the electrode array. NeuroNexus offers a stainless steel, 23 gauge, 35 mm guidetube as an accessory (see page 6). A guidetube of ID greater than 0.44 mm should be used.

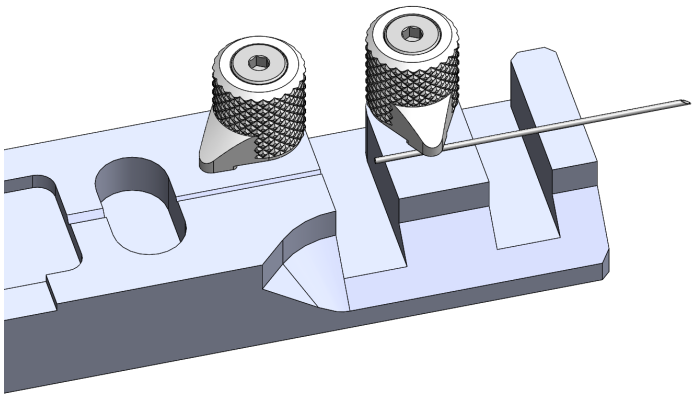
Once the Vector Array™ is fully inserted into the guidetube, remove the Protective Sleeve from the distal end of the guidetube. This will minimize damage to the electrode array and prolong the life of the probe.

Guidetube Loading

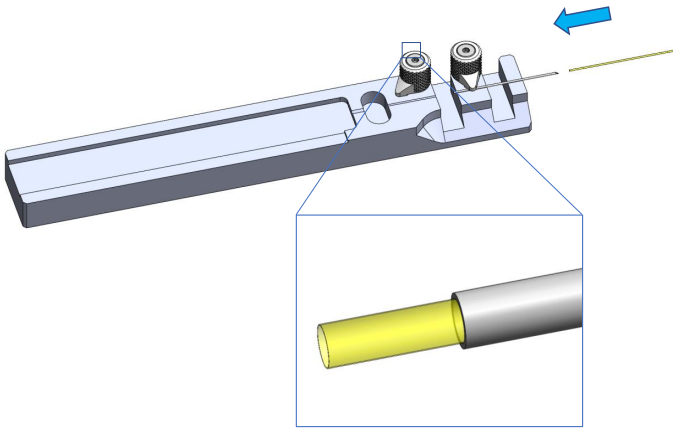
Step1: Remove the cannula from its packaging, taking care to avoid a needle stick. Lay it into the indicated groove, bridging the cannula loading slot. Ensure the beveled tip is pointing away from the loader.



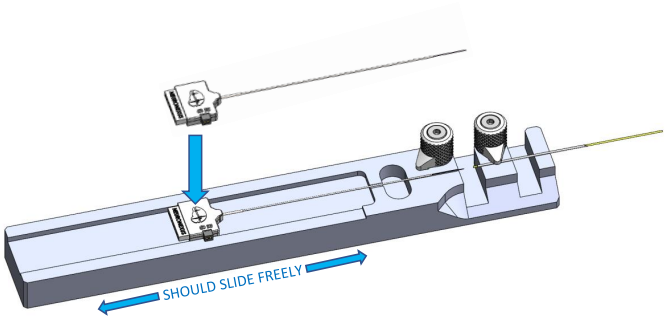
Step2: Gently lift and twist the first spring clamp into position. Release as shown (above) to hold the cannula in place.



Step3: Insert the provided polyimide tube coaxially through the cannula until it becomes visible on the opposite side. This flexible tubing will serve as a soft guide for the electrode, to ensure alignment with the cannula.



Step4: Remove your Vector™ from its packaging and gently lay it in the illustrated position. The device should slide freely in its track with minimal force. Take care not to touch the silicon electrode at the tip.



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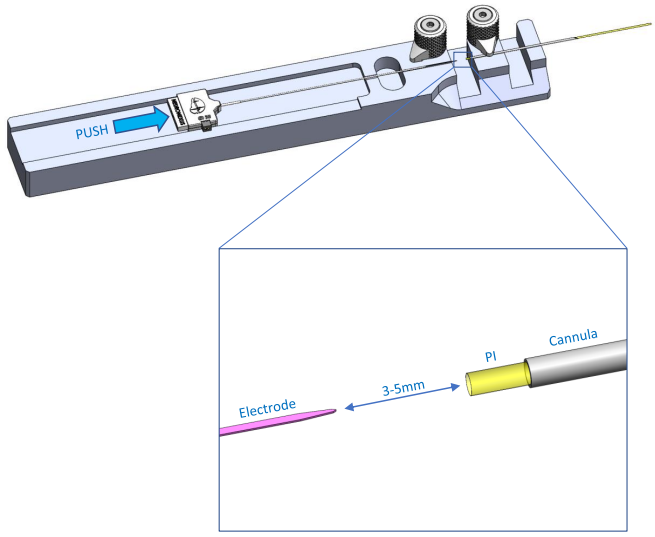
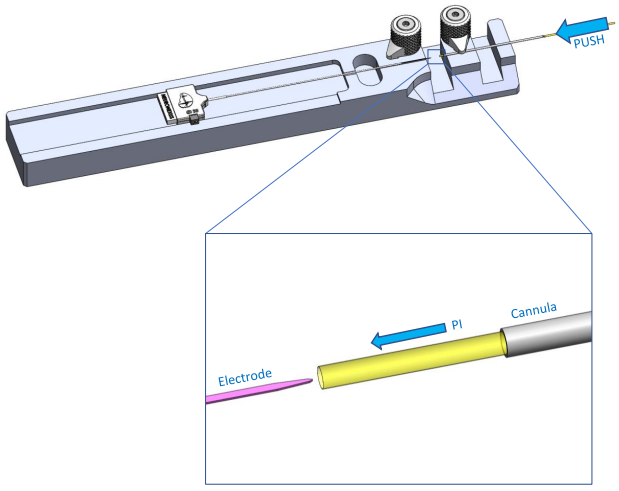
Step5: It is strongly recommended to perform the remaining steps with the aid of a low-power (10-20X) microscope. Advance the electrode until it overhangs the electrode loading slot, 3-5mm from th polyimide tubing.



Step6: Gently push on the polyimide tubing at the front of the loader, slowly approaching the silicon electrode.



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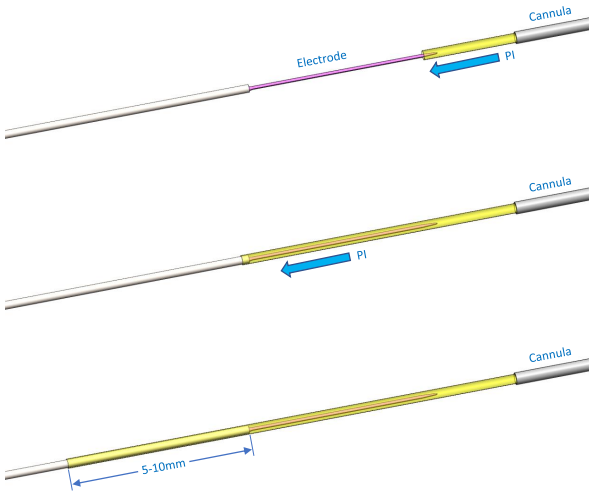
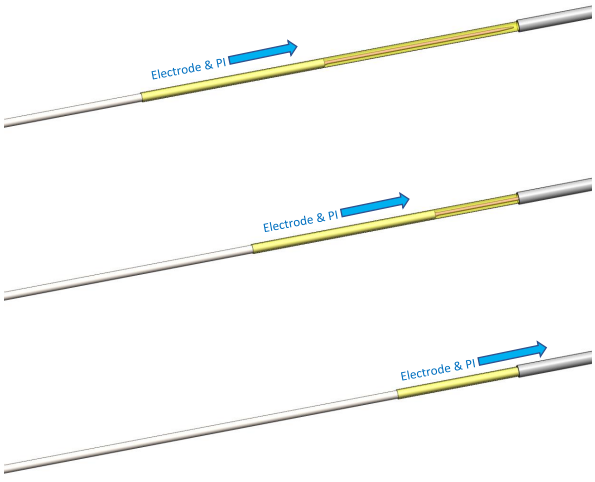
Step7: Slowly advance the polyimide tubing over the tip of the electrode; tweezers may be required for this step. Continue advancing the PI tubing until it extends 5-10mm past the silicon electrode.



Step8: Gently push the Vector™ forward in its track, advancing the electrode into the cannula; excessive force should not be required. **Stop advancing the electrode when it is entirely inside the cannula.**



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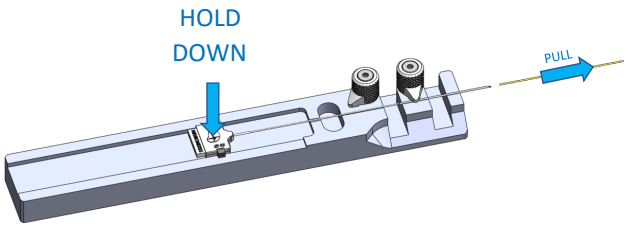
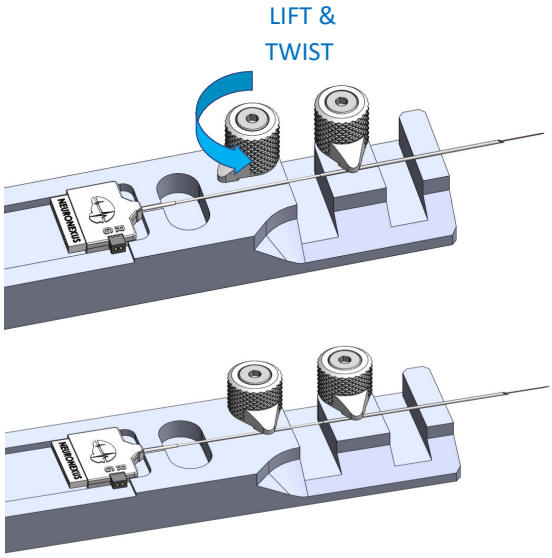
Step9: Do not perform this step unless the silicon electrode is entirely inside the cannula, i.e. not visible at either end. Slowly pull the polyimide tubing out of the tip of the cannula. Keep the tubing as straight as possible.



Step10: Advance the electrode until your desired cannula offset is achieved. The Vector™ can be fixed in place with the unused spring clip, if desired. The Vector™ and cannula are now ready for mounting into your insertion device!



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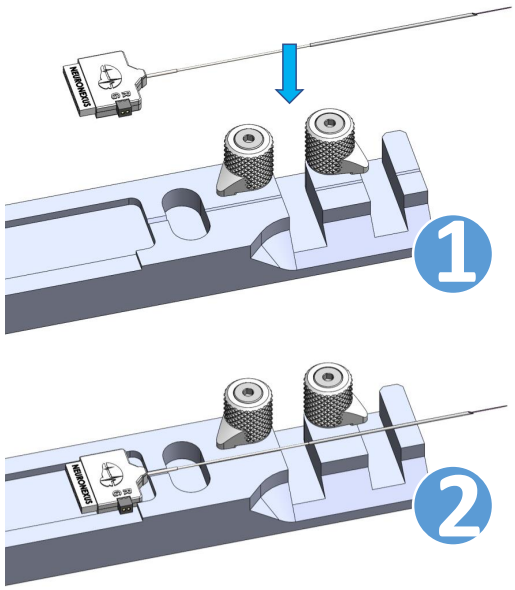
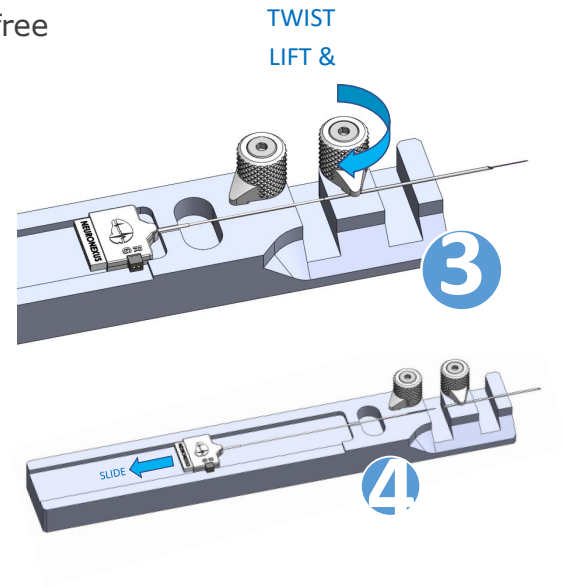
Step11: Removing the cannula. No additional tools are necessary for this step. Return the Vector™/cannula assembly to the loading track. Ensure that the connector is free of any debris or residue that would prevent sliding in the loader track.



Step12: Lock the cannula in place using the first spring clamp. Gently slide the Vector™ away from the cannula. Excessive force should net be required. Stop sliding when the electrode is free of the cannula.



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Handling

- Only handle the Vector Array™ using the Manipulator Bar.
- Be careful not to bend the Vector Array™ when removing it from the case.
- Do not clamp on the implantable electrode.
- Observe the correct cleaning and sterilization procedures.
- After cleaning, allow for at least 30 minutes drying time before insertion.

Sterilization

- The Vector Array™ can withstand EtO (Ethylene Oxide) sterilization.
- If sterilizing with IPA, soak between 5 and 10 minutes. **Do not** soak for longer than 10 minutes.
- **Do not** autoclave the Vector Array™ as this could cause temperature damage.

Cleaning & Maintenance

- After removal from brain, soak in distilled water for 5 minutes.
- Submerge the implantable region in an enzymatic cleaner or protease solution for up to 2 hours. (NeuroNexus recommends using ReNu®) If you have questions or find alternatve solutions, please contact us. **Do not exceed** a 2 hour soak.
- After removal from cleaning solution, soak in distilled water for up to 10 minutes. **Do not exceed** a 10 minute soak.
- Let dry for **at least** 30 minutes between cleaning and use.

We welcome feedback on more optimal cleaning methods!

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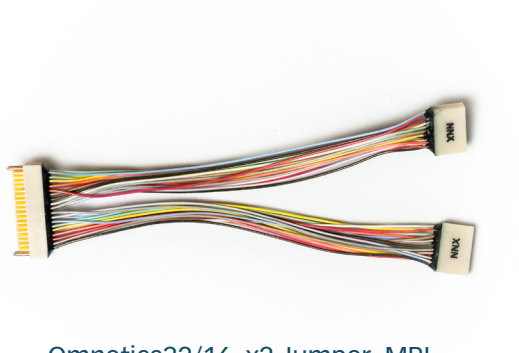
Accessories

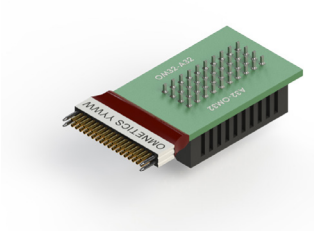
JUMPER CABLES

Omnetics32-M-F-Jumper_MRI
(Approx. length: 2.5" / 6.5 cm)

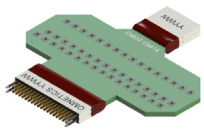


Omnetics32/16_x2-Jumper_MRI
(Approx. length: 2.25" / 6 cm)

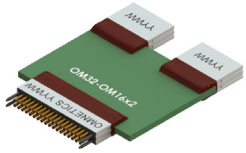
ADAPTORS



Adpt-OM32-A32
(connects to Samtec headstage)



Adpt-OM32-OM16
(Down-converts to 16-channel Omnetics connector. Flexible wiring/ channel mapping)



Adpt-OM32-OM16x2
(connects to two 16-channel Omnetics headstages)

Adpt-OM32-Z32
(connects to 32-channel Zif Clip™ headstage)

GUIDETUBE

Stainless, 23 Gauge, 35 mm length, Lancet tip

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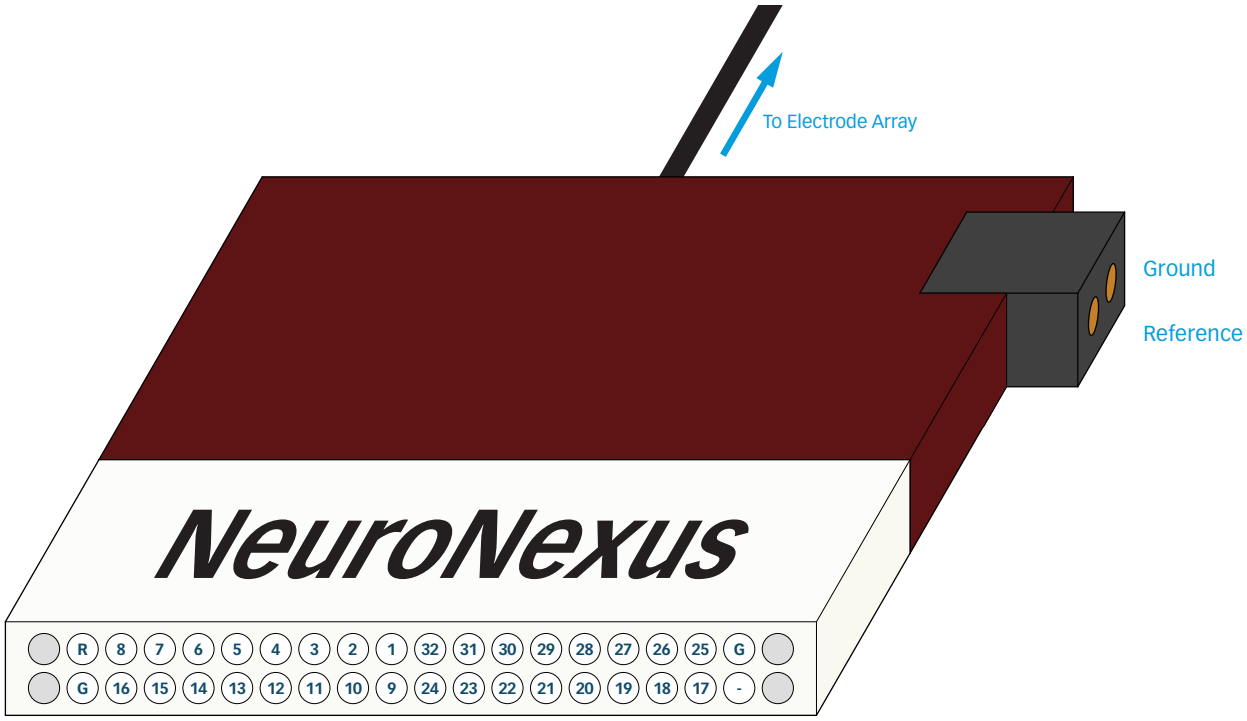
Connector Pin Out



Configuring Wires for Operation

The following notes are provided only as guidelines. Each setup may require experimenting with various configurations to obtain the best results.

1. The Ground (green) and Reference (blue) wires are insulated. The insulation can be removed with heat.
2. Connect the Ground wire (green) to a common shielding point or animal ground. This channel is connected to the instrument ground of the headstage amplifiers.
3. Connect the Reference wire (blue) to a bone screw or underneath skin/tissue. This serves as a reference and is subtracted from the signal channels.

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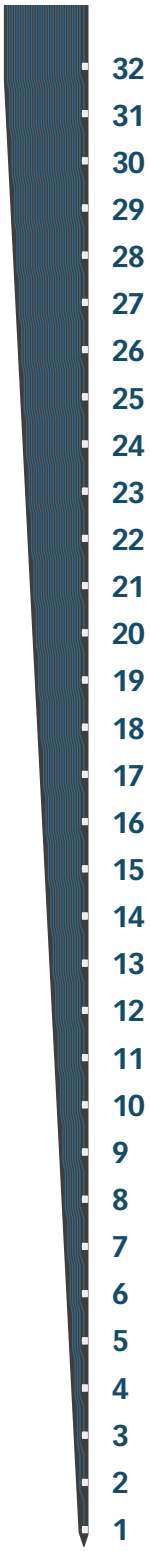
Mapping - Edge



SERIAL №:

NOTE:

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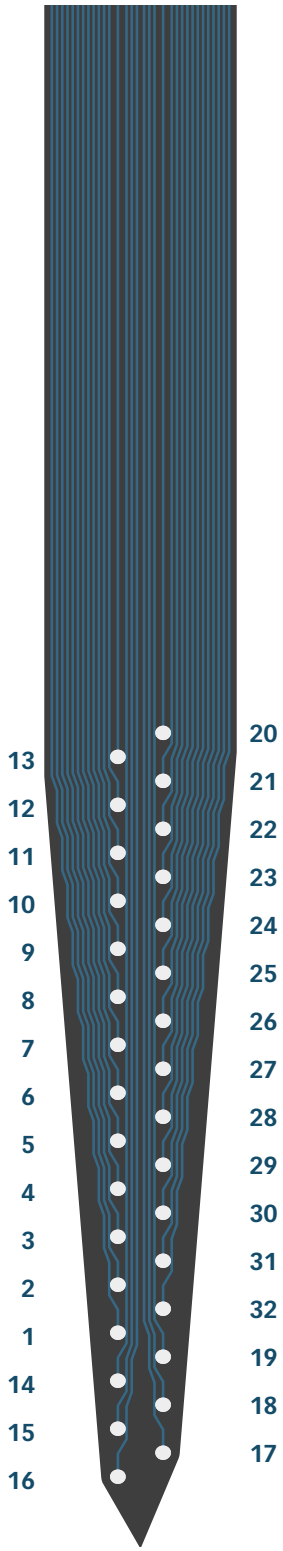
Mapping - Poly2



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