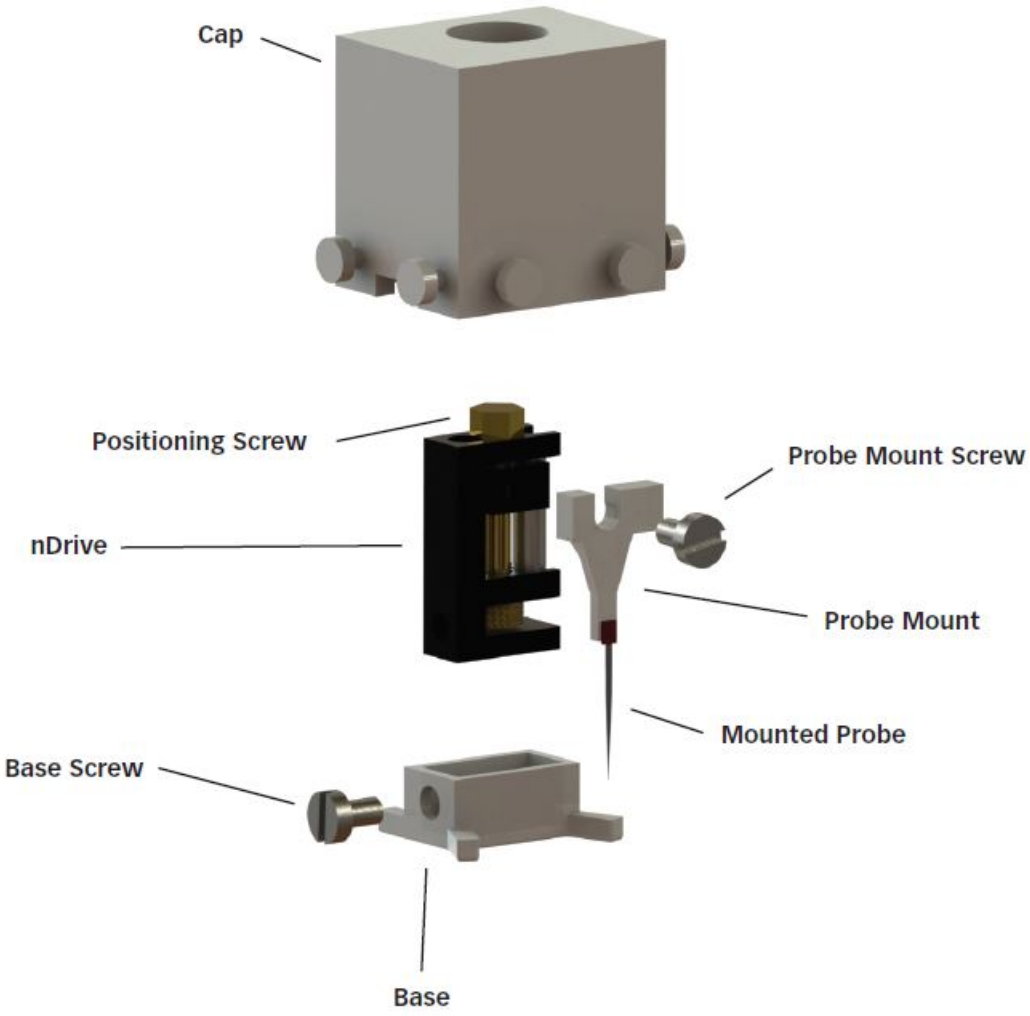
NeuroNexus nDrive Sterilization Device User Manual

Contents

NeuroNexus nDrive Sterilization Device

OVERVIEW

Exploded View



Assembled View

Accessories

nDrive Screwdriver

Stereotaxic Adaptor

Sterilization

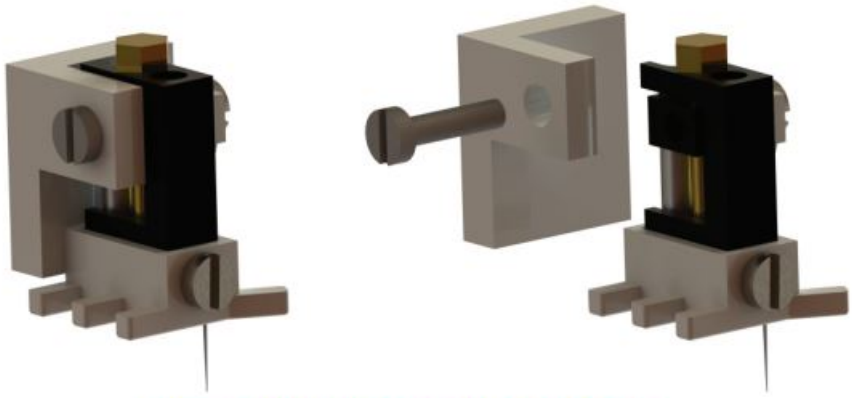
We highly recommend sterilization by soaking in an alcohol-based cleaning solution (10minutes maximum). Lower the entire assembly into the cleaning solution until the Probe

and Base are submerged.

Caution:

high-temperature sterilization may deform parts of the drive. Long immersion in alcohol or water will result in part absorbing the fluid and losing structural integrity. Sterilization via UV may be also used as long as it does not introduce high heat. Users may sterilize the entire case without disassembling the drive if using UV or EtO sterilization

Pre-Implantation Procedures



Removing the nDrive from the Packaging Frame

1. Locate the assembled drive.
2. Disconnect the drive from the packaging frame. Pay close attention to the silicon Probe to avoid damage.
3. Make any necessary modifications to the Base. (Shortening the feet, sanding, etc.)
4. Place the nDrive onto the Base and fasten the Positioning Screw.
5. Sterilize according to the instructions listed above.
6. Mount the nDrive assembly (with Base attached) onto a Stereotaxic Manipulator with the Stereotaxic Adaptor. (The Stereotaxic Adaptor consists of the IST-Adpt and IST-nDrive.)

Implantation Procedures

nDrive Implantation

1. Prepare animals. Perform surgery/craniotomy. Install bone/skull screws.
2. Adjust the position of the Probe to the desired implant depth. Be sure to account for the thickness of the skull and the Base. Tips: some users pre-position the initial Probe implant depth to be some distance above the target during the surgery, then slowly advance the Probe over a course of days/weeks to the target depth. This may minimize tissue damage.
3. Install the nDrive assembly to the Stereotaxic Adaptor and to the Stereotaxic Manipulator.
4. Manipulate the nDrive assembly using the Stereotaxic Manipulator until the Probe tip is directly above the target region. Lower the nDrive assembly and implant the Probe into the tissue. Be careful to avoid blood vessels and minimize any deflection or bulking of the silicon shank. If this happens, wait and let the Probe slowly advance itself into the tissue.
5. Attach the ground and reference wires to the appropriate bone screws.
6. Using the feet of the Base as anchor points, attach the Base to the skull with dental cement.
    - a. Avoid excess contact with nDrive assembly, as this may shift the Probe position set by the Stereotaxic Manipulator.

7. Once the dental cement has fully cured, carefully release the nDrive and the Connector from the Stereotaxtic Adaptor by loosening the screws.
8. Determine the positioning strategy for the Connector (i.e. cement directly on the skull or to the Cap) and take the appropriate action.
9. If necessary, adjust the Probe position by turning the Positioning Screw using the nDrive Screwdriver.
    - Avoid excess downward & lateral force.
    - One complete turn = 282µm travel.

nDrive Screwdriver Attached

    - Counter-clockwise turn = downwards travel
    - Clockwise turn = upwards travel
10. Once the desired Probe position/recording quality is reached, seal the craniotomy using appropriate materials such as sterile Vaseline or a mixture of paraffin and mineral oil (Fisher Scientific 10-20g in 10mL, heated at 65oC).
11. Place the Cap or Copper Mesh in place and cement the enclosure to expose only the Connector with access to the Positioning Screw.

NOTES

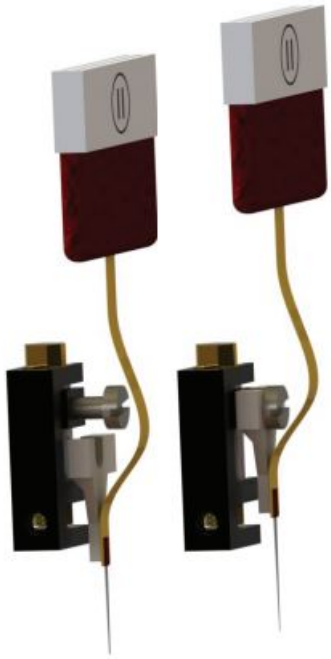
- It may be helpful to connect the headstage during the insertion and prior to the close-up in order to make sure the Probe is working properly.
- The niPOD can provide useful impedance monitoring pre-and post-surgery
- For additional surgical guidance, view the Buzsaki lab's JoVE article, available in the Support section of the NeuroNexus website.

Post-Implantation Procedures

Headstage Connection It may be easier to keep the headstage connected to the Probe Connector using rubber bands. Post-Implantation Probe Position Adjustment

- Monitor impedance using the niPOD. This may help you determine the condition of the electrode-tissue interface.
- Using the drive Screwdriver, adjust the Probe position until signal quality is improved.
- One full rotation of the Positioning Screw corresponds to 282µm. Turning counter-clockwise = downwards travel. Turning clockwise = upwards travel.

Mounting a New Probe



Mounting a New Probe

The drive is reusable. However, the Base, Cap, Probe Mount, and Probe are not and must be disposed of at the end of the chronic experiment.

1. To recover the nDrive, disassemble the Cap to expose the nDrive. Depending on cement strength, this may require destroying the Cap.
2. Unfasten the Positioning Screw and detach the nDrive from the Base.
3. Unfasten the Probe Mount Screw and detach the used Probe Mount from the nDrive.
4. Locate the new Probe, mounted on the new Probe Mount.
5. Slide the Probe Mount onto the nDrive, aligning the holes. Be careful not to break or damage the Probe. (It may be easier to first secure the new Connector to the Stereotaxic Adaptor.)
6. Fasten the Probe Mount Screw to secure the Probe Mount.
7. The nDrive is now ready for the next surgery.

Specifications

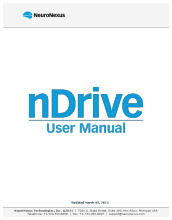
Screw Specifications

- Base Screw: M1.2, 2mm length
- Probe Mount Screw: M1.2, 2mm length
- Positioning Screw: #00-90 thread, 5/16” length

Acknowledgments

NeuroNexus would like to thank Dr. Liset Menendez de la Prida (Instituto Cajal CSIC) and Dr. Bijan Pesaran (NYU) for their feedback on the nDrive design.

Documents / Resources



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