Neuralynx
High Density Electrophysiology Recording Systems

VersaDrive 8 Optical Construction Manual

8 Tetrode VersaDrive

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Document Revision History

10/03/2012	Revision 1.0	Initial Creation
5/20/2013	Revision 1.1	Added Figure G; removed VersaDrive 8 Construction Manual and referenced it.

VersaDrive 8 Optical Manual Expansion

The VersaDrive 8 Optical is a modification of the original VersaDrive 8. Thus, the construction of the VersaDrive 8Optical is very similar to that of the VersaDrive 8. This document is designed to pair with the VersaDrive 8 manual to describe the extra steps necessary to build a VersaDrive 8 Optical. This document references figures and sections in the VersaDrive 8 manual with additions and changes. Please note these figure and section numbers in **Bold** refer to sections and figures in the VersaDrive 8 manual, not this document. Figures in this document that are labeled with letters are exclusive to this document. Please review all of these changes in conjunction with the VersaDrive 8 manual before beginning assembly of the drive.

Important Note: Below is a rendering of a ferrule based fiber implant. These can be obtained from companies such as Doric Lens, Thorlabs, or they can be made in the lab with special equipment. They are NOT included in the VersaDrive 8 Optical Kit. The minimum length for the fiber extending from the bottom of the ferrule is 15mm. At this length the tip of the fiber will recess into the base when the optical shuttle is fully raised. The diameter of the hole in the base for the fiber to pass through is 0.3mm.

Figure A – An example of an Ferrule-based fiber

Note: The polymicro tubing shipped with this drive has an OD of 165μm and an ID of 100 μm. Tetrodes were loaded successfully using 12μm NiCr wire. This is not the only type of wire that can be utilized. If using a different wire, check that it will work with the polymicro tubing provided prior to construction.

3. Parts list for 8 tetrode VersaDrives – In addition to the parts list in the VersaDrive 8 manual, the VersaDrive 8 Optical also includes an optical shuttle (included) and a ferrule based fiber of the user's preference (NOT included). Additionally there are 2 additional insect pins and 1 extra drive screw for the Optical Shuttle. Figure B shows renderings of (left to right) the cap, housing, base, and optical shuttle.

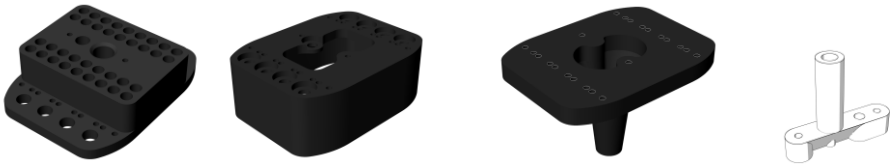

Figure B. Left to Right VersaDrive 8 Cap, Housing, Base, and Optical Shuttle.

5. Assembling the tetrode carriers – (**5.2 Assembling the Optical Shuttle)**. The optical shuttle is form-fitted to accept a 1.25mm ferrule-based fiber. The ferrule-based fiber can be obtained preassembled from several companies including Thorlabs and Doric Lenses. They can also be assembled in the lab with the proper equipment. This shuttle is designed to accept a 1.25mm ferrule with the fiber of the users choice (**The diameter of the hole for the fiber to pass through in the base is 0.3mm, some fibers will need to be stripped to fit in this hole including some 200μm fibers**). The figure below shows how to insert the ferrule-based fiber into the shuttle. A few drops of gel superglue are recommended to keep the ferrule in place in the optical shuttle. The completed optical shuttle is on the right.

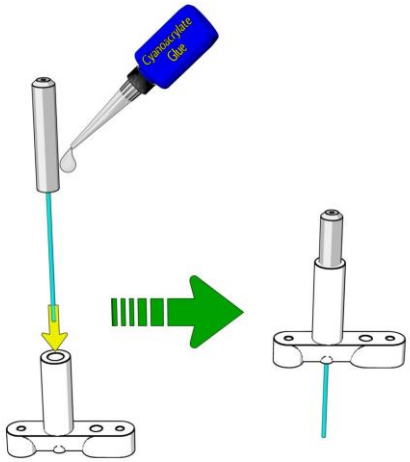

Figure C- Assembly of the optical shuttle

Figure 1.2 – Note when comparing the VersaDrive 8 and the VersaDrive 8 Optical shuttle, the tetrode shuttles on the sides of the drive are separated by a gap for the VersaDrive 8 optical shuttle to fit in-between. Figure D is an overhead view of the optical shuttle in the middle flanked by four tetrode shuttles on the top and four on the bottom.

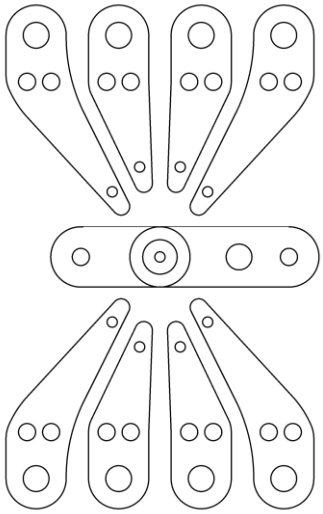

Figure D – Overhead view of the VersaDrive 8 shuttles.

Figure 2.7 and Figure 2.8 – Inserting the optical shuttle. This should be done between **Figure 2.7** and **Figure 2.8**. The assembled optical shuttle/fiber should be run through the center hole of the VersaDrive 8 Optical Tip. The insect pin guide rails should be inserted from the bottom of the base just like the tetrode shuttles (see figure 4).

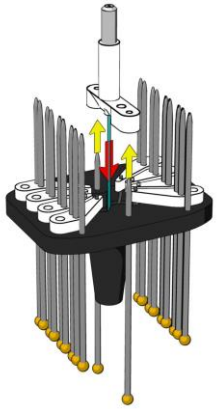

Figure E – Inserting the optical Shuttle.

Figure 2.8 – Insert the optical shuttle screw. This is done the same as the tetrode shuttles. **Warning: When inserting the optical shuttle and raising this shuttle, be careful. The optical shuttle screw has no barrier around the head of the screw. It is very easy to slide the screwdriver off of the head off the screw and damage a polymicro tube.**

Figure 2.9 Raise the optical shuttle and then lower it. If the optical shuttle is raised it may get in the way of loading tetrodes.

There are no further steps exclusive to the Optical Shuttle. However, before the drive is implanted ensure that the shuttle is fully raised to allow downward travel after implantation.

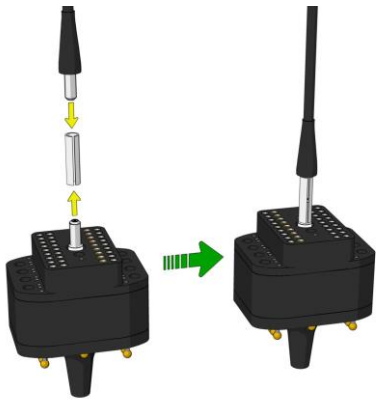

Figure F - Above is an example of connecting a completed VersaDrive 8 Optical to an optical cable terminated with a 1.25mm ferrule and a zircon sleeve. It is recommended to put more of the zircon sleeve onto the cable than on the implant as the sleeves can be very tight fitting and hard to remove. Additionally, it is recommended to cover the end of the optical implant while not attached to a fiber as the polished end can and will be damaged if left exposed.

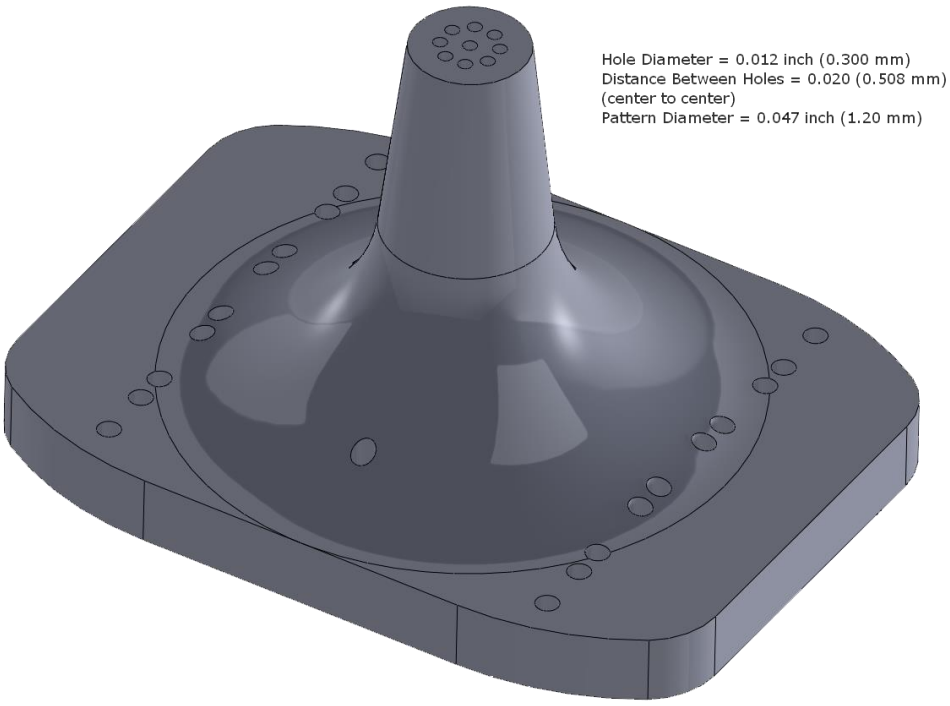

Figure G - Drawing of the VersaDrive-8 Optical standard exit hole pattern. The holes have diameters of 0.012 in (0.300 mm) with a spacing distance of 0.02 in (0.508 mm) center to center. The pattern diameter is 0.047 in (1.20 mm).

Refer to the VersaDrive 8 Construction Manual for additional information and referenced Figures and Sections. Please review all of these changes in conjunction with the VersaDrive 8 manual before beginning assembly of the drive.