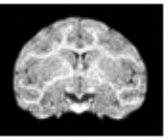

User's manual: Grounding and Impedance Testing

Grounding and Impedance Testing (Titanium Chamber)

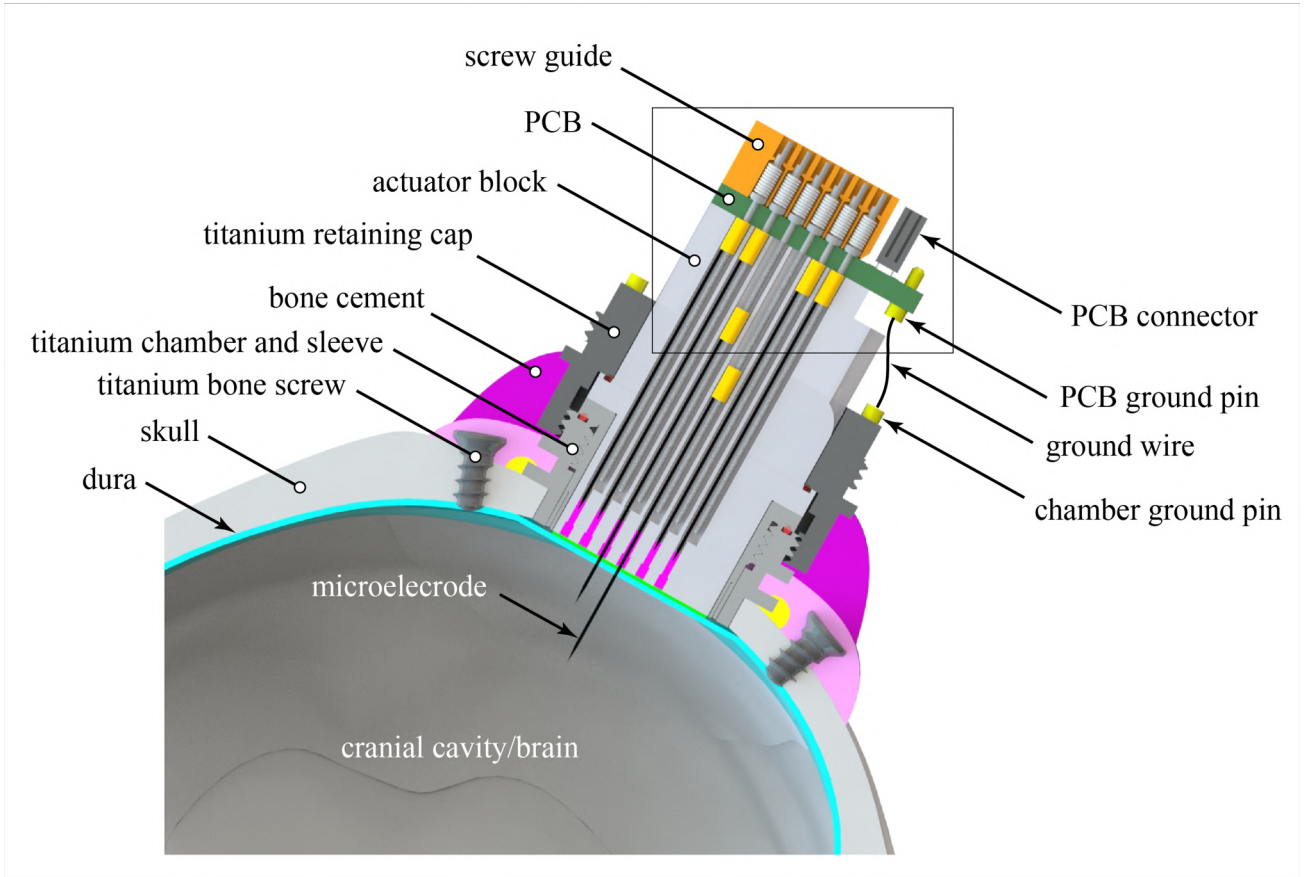

Figure 1. Coronal cutaway view of an SC32 microdrive installed within a tangential Titanium chamber system. The chamber and retaining cap are in contact with the animal and provide a distributed ground and reference. The ground wire links the retaining cap to the reference and ground connections on the PCB connector.

Electrode signal path: electrode → shuttle → leadscrew → PCB → PCB connector
Reference and ground signal path: animal → chamber → retaining cap → ground wire → PCB connector

Grounding and Impedance Testing (MRI-compatible chamber)

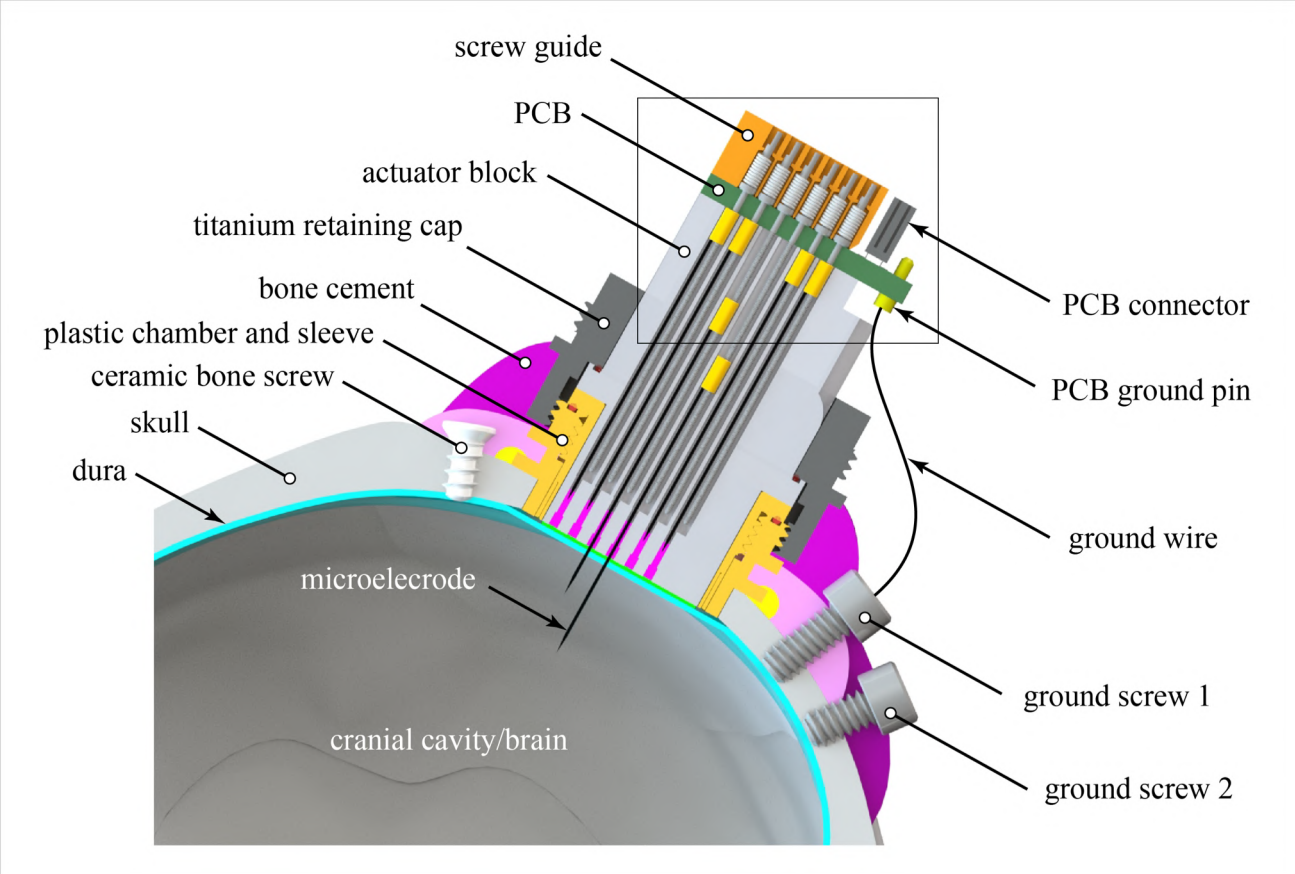

Figure 2. Coronal cutaway view of an SC32 microdrive installed within a tangential plastic (PEEK) chamber system. The chamber is electrically isolated from the animal. Ground and reference connections are made through separate stainless steel screws. Connection between the ground screws and the PCB is made by an insulated wire with a clip lead on one end and a male pin on the other.

Electrode signal path: electrode → shuttle → leadscrew → PCB → PCB connector
Reference and ground signal path: animal → ground screw → ground wire → PCB connector

Grounding and Impedance Testing (Actuator Detail)

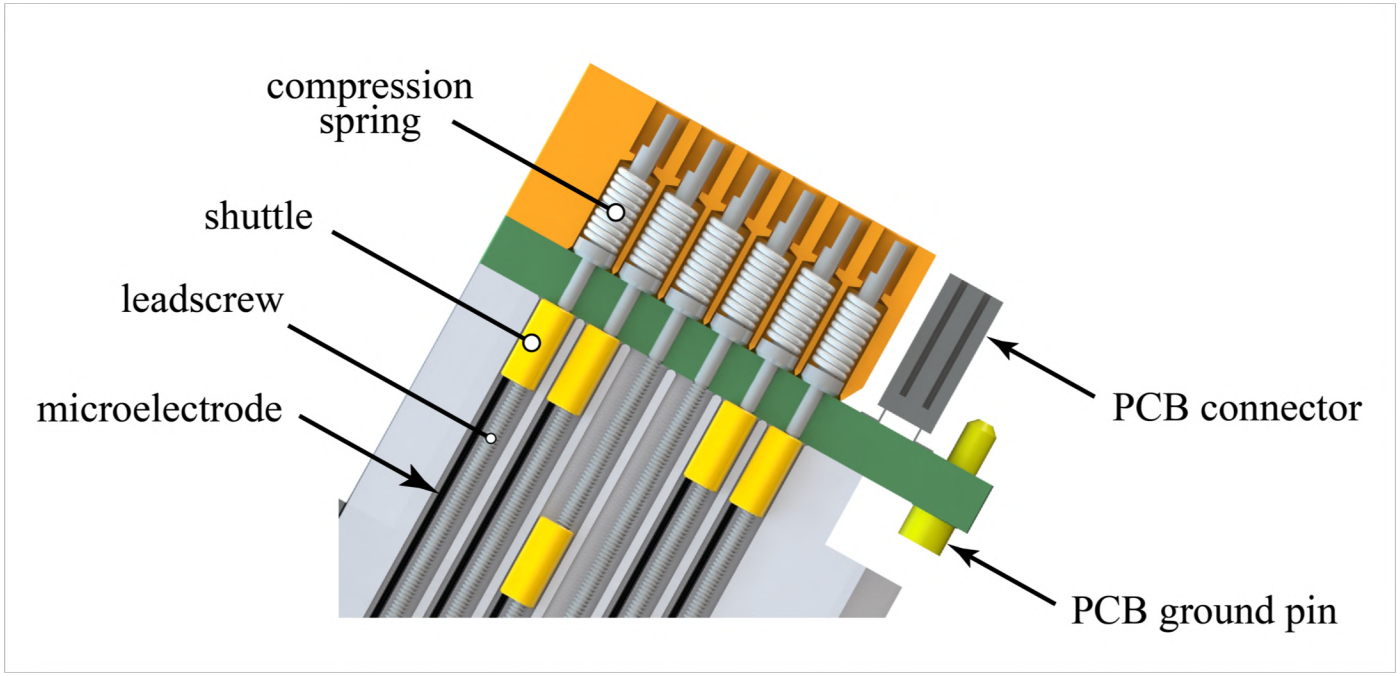

Figure 3. Close-up of the actuator components.

Details of impedance testing

The impedance of each electrode can be tested in two ways. One method uses a computerized or automated system, such as the Nano-Z made by White Matter (http://www.white-matter.com/nanoz/). The impedance tester is plugged directly into the PCB connector and impedance is measured with respect to ground on the animal. A second method utilizes a manual, single-channel impedance meter, such as the IMP-2A made by Bak Electronics (https://www.bakelectronicsinc.com/IMP-2A%20&%20IMP-2AMC.pdf). One lead of the meter is attached to ground and the other lead can be placed in direct contact with the head of each lead screw. If necessary, the tip of the lead can be ground to a point in order to make contact with the leadscrew. With either method, it is important to make sure that the ground connection has a low impedance pathway with the animal. Otherwise the impedance readings may be unreliable. If this is a concern, one end of the manual impedance meter can be placed gently in the animal's mouth and the other lead can make contact with the ground connection. If that pathway is low impedance (e.g. 0-10 kOhm) then a good connection has been established with the ground.

Note:
The manual Bak impedance meters don't provide reliable impedance readings >2.5 MOhm. An open or intermittent circuit is often indicated when the impedance is >2.5 MOhms.