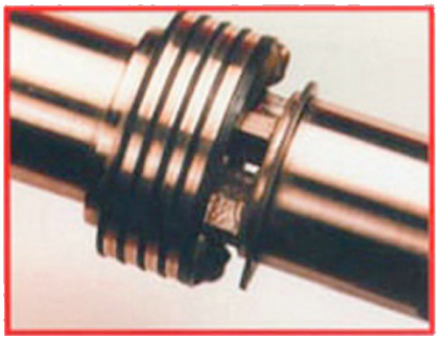
HIGH QUALITY INSTRUMENT GRADE SLIP RING ASSEMBLIES
A TECHNICAL DISCUSSION

Slip ring assemblies incorporated in the design of rotating slip ring torque sensors consist of three (3) basic elements; the ring assembly, brush assembly, and interconnecting leads. Each ring is electrically conductive and provides a circuit path over a full 360° of ring assembly rotation. Brushes ride on the rings and provide electrical contact between the rotating rings and the stationary parts of the torque sensor. Leads connect the rings to the stain gage bridge and the brushes to the non-rotating part of the torque sensor. High quality instrument grade slip rings are made with solid coin silver eliminating any "wear through" problems that may occur with plated conductor materials. Electrical noise caused by wear and resistance fluctuation in slip rings made of plated conductors is almost non-existent in slip rings made from solid coin silver. The slip rings are cast to the rotating torque shaft preventing any individual ring movement or slippage as the unit wears with age. During the casting process enough space is provided between each ring to eliminate cross talk. Silver has a resistivity of 1.629 microhms/cm^3 and is the lowest value among common conductor materials including copper, gold, and aluminum. Slip rings made with solid coin silver and that are properly maintained have almost infinite life.



Brushes used in an instrument grade slip ring assembly are made from a composite of 80% coin silver and 20 % graphite. Two (2) brushes are used on each solid coin silver ring to insure a positive electrical contact. Signal quality is the same whether the torque sensor shaft is rotated in the CW or CCW direction. The silver/graphite composite assures the user of signal transmissions with high integrity and slip ring assemblies that require minimal care and maintenance.

Silver oxidizes, and brush wear is at its highest level during the initial seating of the brushes or when the torque sensor is placed in operation after a period in storage. When the torque shaft is rotated, the brush abrades the silver oxide layer away to expose the solid coin silver conducting surface and deposits a thin film on the ring that aids the lubricating process. Graphite in the brush reacts with moisture in ambient air to provide a self-lubricating action on the ring Humidity is an essential part of the lubricating process between the slip rings and brushes. Therefore the following conditions should be avoided:

- The presence of oil or oil contaminated atmospheres.
- The presence of an inert gas, such as nitrogen.

An air purge system should be applied to the torque sensor housing if an oil mist environment is likely. Dry, filtered shop air, at 0.5 to 1.0 psi above atmospheric pressure, is suitable. This will provide a positive air potential inside the sensor housing, reducing the likelihood for infiltrated contamination. A high-pressure air purge should be avoided as it can cause the bearing lubricant to extrude from the bearing housing. Oil in oil mist atmospheres surrounding slip ring assemblies can act as a cutting agent, and silver in the brush can behave as a cutting tool on the ring. Upon visual inspection, fine "hairs" of silver are indicative of the presence of oil. If this happens the coin silver ring can usually be machined to a "like new" condition.

To maintain a satisfactory signal to noise ratio, rings and brushes should be periodically cleaned. Refer to SensorData's Technote 9812/N049 for a discussion about brush life and other maintenance issues relating to rotating slip ring torque sensors or consult the factory for further assistance.

 | 50207 Hayes Road | Shelby Township, MI 48315 USA
Tel: +1.586.739.4254 | Fax: +1.586.739.5689 | sales@sensordata-burster.com | www.sensordata-burster.com