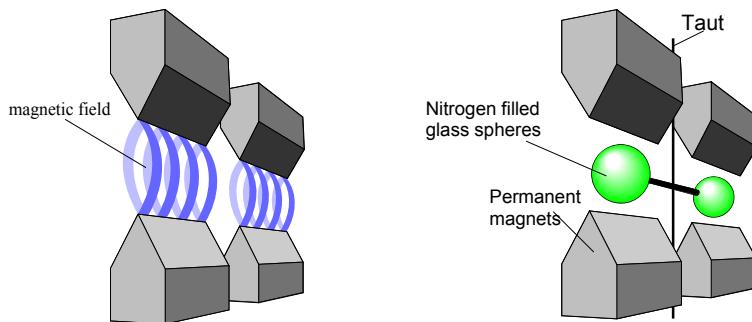




1.5 Servomex Paramagnetic Measurement Principles

The sensor utilises the paramagnetic susceptibility of oxygen, a physical property which distinguishes oxygen from most other common gases.

The sensor incorporates two nitrogen-filled glass spheres mounted on a strong, rare metal taut-band suspension. This assembly is suspended in a symmetrical non-uniform magnetic field. When the surrounding gas contains paramagnetic oxygen, the glass spheres are pushed further away from the strongest part of the magnetic field. The strength of the torque acting on the suspension is proportional to the oxygen content of the surrounding gases.



The measuring system is "null-balanced". The 'zero' position of the suspension assembly, as measured in nitrogen, is sensed by a split photo-sensor that receives light reflected from a mirror attached to the suspension assembly. The output from the photo-sensor is fed back to a coil wound around the suspension assembly. This feedback achieves two objectives:

When oxygen is introduced to the cell, the torque acting upon the suspension assembly is balanced by a restoring torque due to the feedback current in the coil. The feedback current is directly proportional to the volume magnetic susceptibility of the sample gas and hence, after calibration, to the partial pressure of oxygen in the sample. A voltage output is derived which is proportional to the feedback current.

In addition, the electromagnetic feedback stabilises the suspension (damping oscillations heavily) thus making it resilient to shock and vibration.

