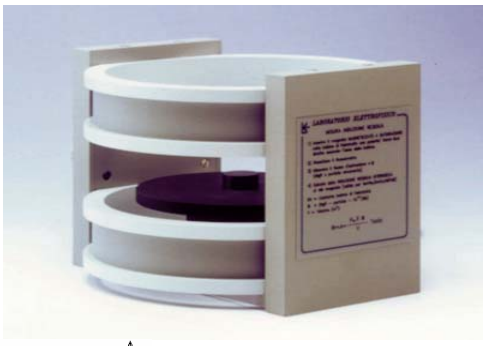
Controlling the quality of permanent magnets

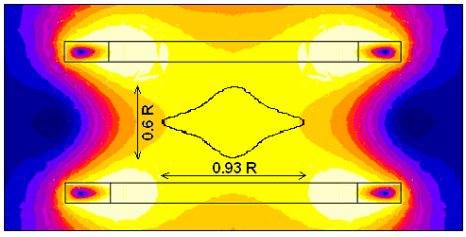
The fluxmeter is often used to control the quality of permanent magnets. The main reason is its versatility: it is possible to build wound fluxmetric coils that match perfectly any magnetic item to be measured. The same fluxmeter can measure a big variety of devices using the proper measuring coils.
Although there are devices than need an 'ad hoc' coil, there are some 'universal' coils suitable for wide ranges of shapes, dimensions, materials: it is the case of **Helmholtz coils** and **potential coils**.

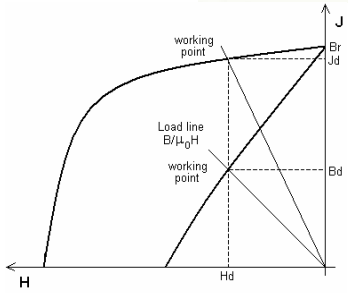
Helmholtz coils

Helmholtz coils are probably the most easy, fast and cheap way to control the quality of permanent magnets. They are made by two identical coaxial coils fixed at a distance equal to their radius. This configuration permits a wide uniformity volume inside the coil, guaranteeing a measure independent from positioning errors. The picture below shows the uniformity volume in a Helmholtz coil.
The measure with Helmholtz coils is described in the International Standard IEC 60404-14.



Uniformity volume inside Helmholtz coils





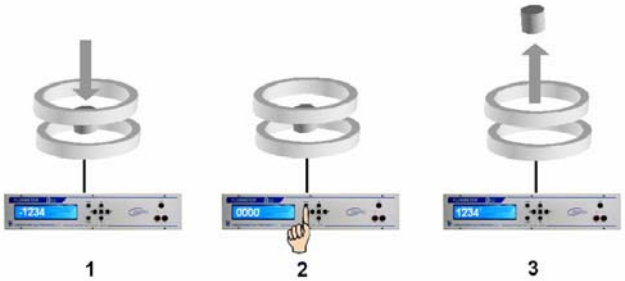
The working point of a permanent magnet

The Helmholtz coil's reading is proportional to the residual induction Br of the material (more precisely, to the magnetic polarisation of the working point J_d, see picture above). The measuring procedure, very simple, is quickly described below.
J_d is calculated by the read flux and the coil's constant K_H (that is given in the coil's certificate) using the formula:

$$J_d = \frac{K_H \cdot \Phi}{V}$$

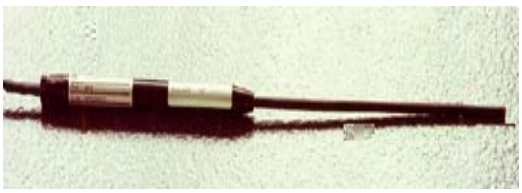
V = magnet's volume
Φ = read flux


Suitable for arc segments too !



Potential coils

If *H* is a constant magnetic field between two points at a distance *d*, the difference of magnetic potential *ΔP* between the two points is given by $\Delta P = H \cdot d$.
The potential coils permit to measure easily the demagnetization field H_d of a permanent magnet through the measure of the magnetic potential. It is sufficient to know the thickness *d* of the magnet and make a measure of flux Φ in its surface with the potential coil to calculate H_d: $H_d = 2K_p \cdot \Phi / d$ where K_p is the constant (certificate) of the potential coils.



Three standard models available: PM/S83, PM/S214 e PM/S410.