



Application Note PE012

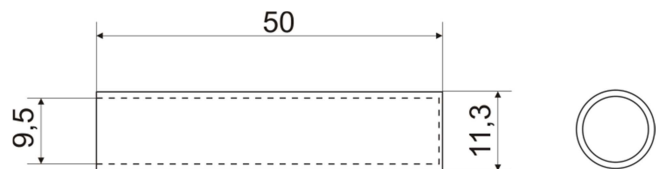
1	Zero Chamber	1
2	Shielding effect	1
3	Zero Point Adjustment	3
3.1	Method 1 – in the Earth Magnetic Field.....	3
3.2	Method 2 – with Zero Chamber	3

1 Zero Chamber

A zero chamber is a structure where in the inside the magnetic field is strongly attenuated compared to the outer field. In the simplest case, it is a one side closed pipe of good magnetic shielding metal (Mu-metal).

Normally at least the earth magnetic field has to be shielded. In addition there may be other interfering fields from the environment.

For our AS-active-probes we deliver a zero chamber as optional accessory.



2 Shielding effect

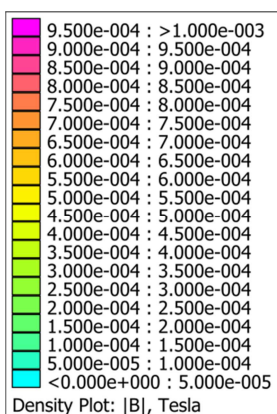
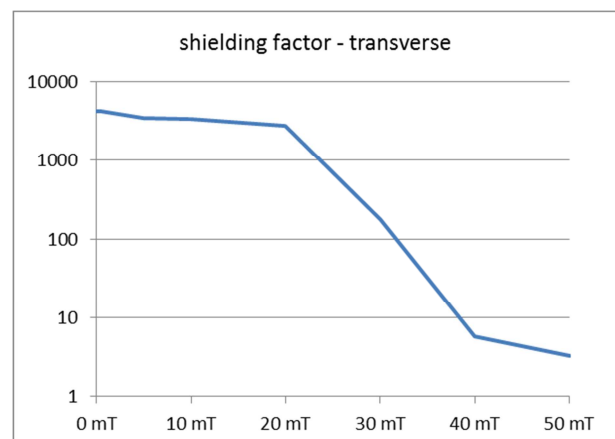
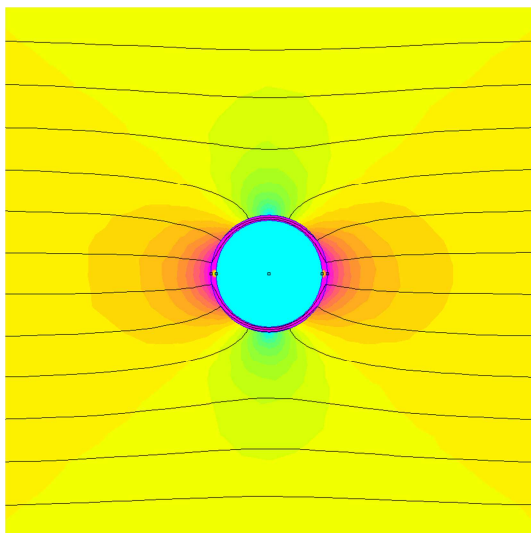
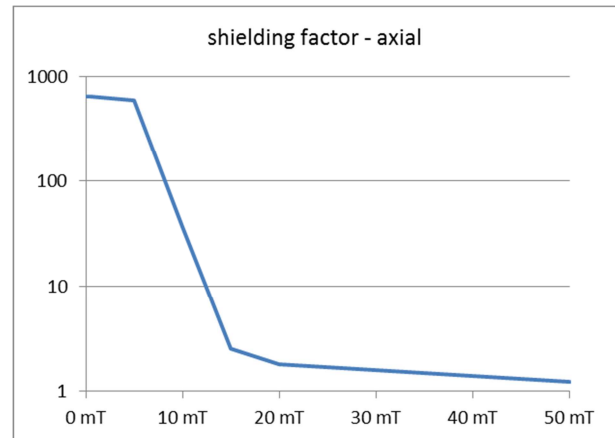
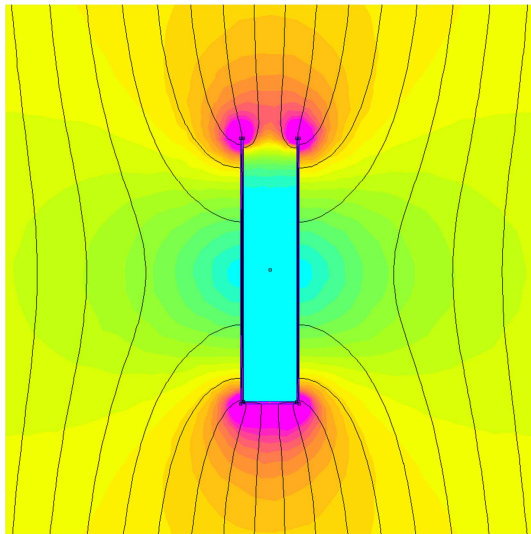
The shielding effect of a zero chamber is based on the principle that the magnetic field is conducted through the material and around the inside space. A concentration of the flux occurs in the material of the zero chamber. At a certain value of the outer field the material saturates. Therefore the field can't be shielded any further.

The following images show simulations of our zero chamber at an outer field of 500 μ T. The direction of the outer field once is axial and once it is transverse.

In the diagrams the shielding factor is plotted in dependence of the outer field.



Zero Chamber - Zero Point Adjustment



The actual achievable shielding factor among other things depends on the distribution of field as well as geometry, wall thickness and specific material properties of the zero chamber. Therefore the diagrams should be used as rough indication only.



Zero Chamber - Zero Point Adjustment

3 Zero Point Adjustment

If you often measure at the lower sensitivity limit of the probes or if you need extra precise measurement values, then you should examine the zero point of the probe before measurement. A shift of the zero point due to offset and zero point drift of the AS-active-probes can be compensated with the zero function of the Teslameter FM 302.

3.1 Method 1 – in the Earth Magnetic Field

With probes of class H, N and L in most sensitive respectively with probes of class U in the least sensitive measurement range and in measurement mode DC, the measurement direction of the probe is oriented perpendicular to the earth magnetic field in east-west direction. With the “zero” key of the Teslameter FM 302 a compensation of the zero point is made. Afterwards the probe should show the same value only differing in sign if oriented in north-south direction or in south-north direction. The typical value of the earth magnetic field is 30 μT to 50 μT in the area of Europe.

3.2 Method 2 – with Zero Chamber

The more appropriate method is to make sure by shielding, that there is really no significant magnetic field which influences the probe of the teslameter while adjusting the zero point. Therefore the AS-active-probe is inserted into a zero chamber. Now it can be assumed, that the magnetic field is sufficient shielded. With the “zero” key of the Teslameter FM 302 a compensation of the zero point can be performed.