STRAY FIELD COMPENSATED COILS
MSK

MSK 101

• Description

The stray field compensated coils from Magnet-Physik are based on a new coil design that was invented at the PTB (Physikalisch-Technische-Bundesanstalt). They have significant advantages, compared to conventional Helmholtz coils or solenoids.

The compensated coils can be used in two ways. In connection with a current source they generate extremely homogeneous magnetic fields. Connected to a fluxmeter, they can be used to measure the magnetic moment or dipole moment of permanent magnets.

If a compensated coil is used to generate a magnetic field, it produces very little stray field outside the bore. This can avoid magnetic shielding in many applications. On the other hand, the homogeneous field region of these coils is very large with respect to the coil dimensions. The magnetic field strength inside the bore can be calculated by multiplying the constant of field strength of the coil with the applied current as for any other conventional coil system (like a Helmholtz coil or a solenoid).

If a compensated coil is used to measure the magnetic moment of permanent magnets, it is much less sensitive to external disturbances (for instance in the vicinity of other magnetic objects) than a conventional Helmholtz coil. This increases the measurement reliability. Since the homogeneity region inside its bore is significantly expanded compared to a Helmholtz coil with the same winding diameter, much larger magnets can be measured with lower uncertainty.

• Applications

Compensated coils can be applied in the following areas:

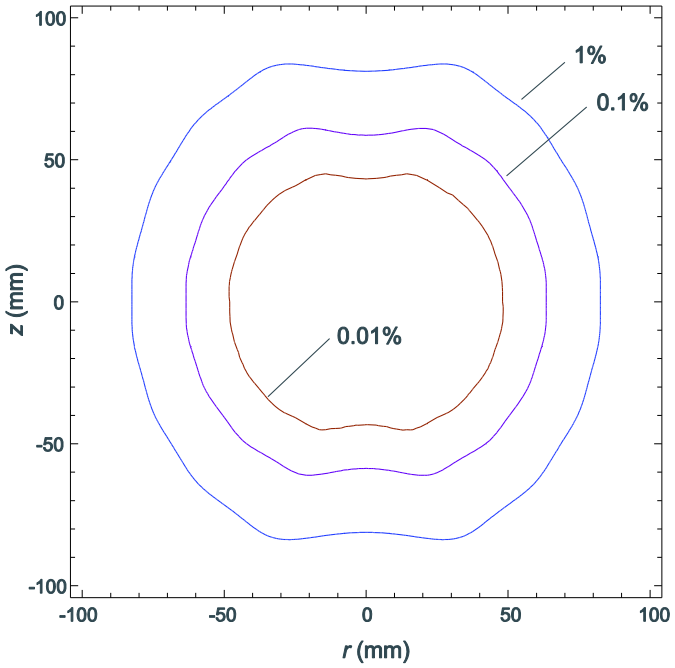
- Quality control of permanent magnets
- Magnet testing
- Magnet sorting
- Materials research
- Development of magnet systems
- Generation of magnetic fields
- Quality control of sensors
- Quality control of actuators
- Calibration
- Polarization coil for magnetorelaxometry of magnetic nanoparticles

• Technical Data of Standard Compensated Coils MSK

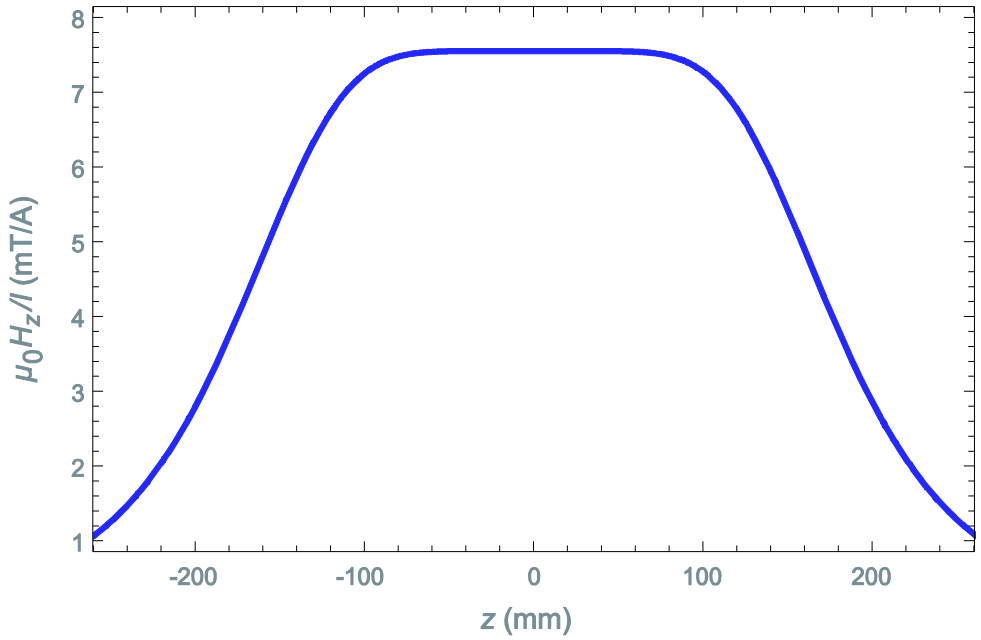
Model	Free pass-through (mm)	Approx. volume for 1% accuracy (mm)	DC-Resistance R (Ω)	Measuring constant k_M (cm)	Flux density constant k_B (mT per A)	Fields of application
MSK 101	140	160 dia.·160	290	0.0165	7.60	1), 2)
MSK 100	60	54 dia.·54	100	0.0213	5.90	1), 3)
MSK 105	30	32 dia.·32	55	0.0134	9.38	1), 4)
MSK 102	140	160 dia.·160	540	0.0163	7.72	2)

1) field generating coil, 2) magnetic moment measurement coil, 3) polarization coil for magnetorelaxometry, 4) polarization coil for NMR measurements.

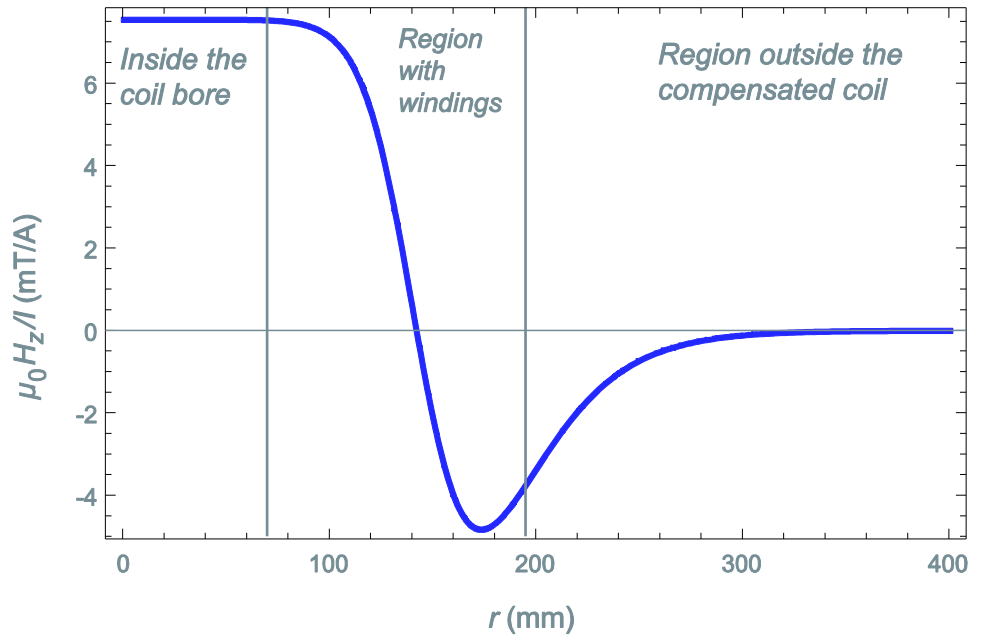
Due to continuous product improvements, specifications are subject to change without notice



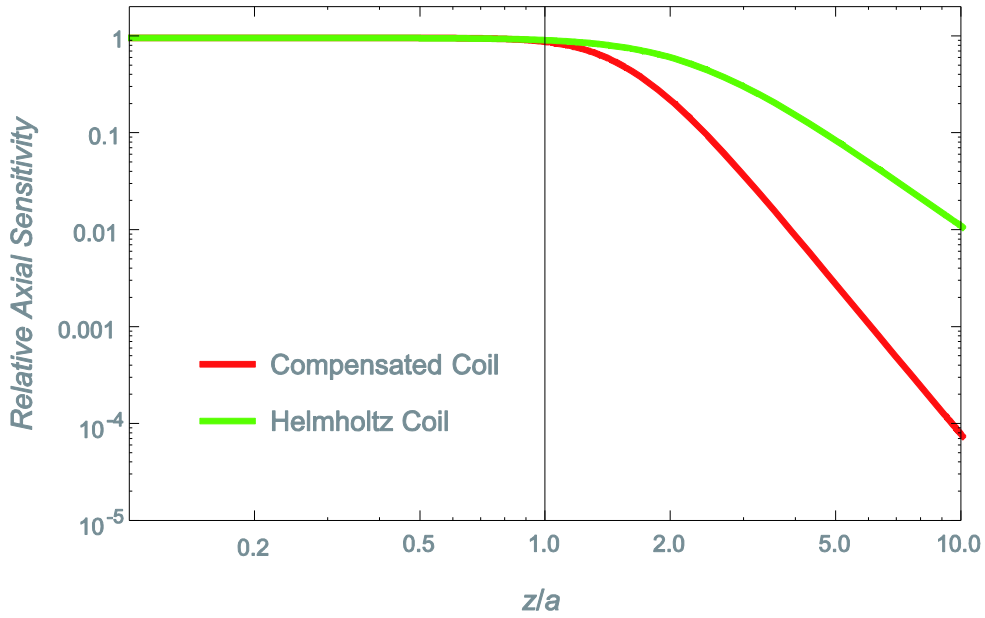
Homogeneity limits for the stray field compensated coil MSK 101



Field profile on the symmetry axis (i.e. for r = 0) of the stray field compensated coil MSK 101 demonstrating the very homogeneous region inside. (Note the flat plateau around z = 0 and the rapid decrease of the field amplitude at the edges of the coil.)



Radial field profile for z = 0 of the stray field compensated coil MSK 101 for the different regions of the coil. (Again note here the homogeneous regime inside the coil bore and the rapid decrease of the field amplitude in the region outside of the coil.)



Comparison of the relative sensitivity on the z-axis for magnetic moment measurements of the compensated coil set (red line) and of a Helmholtz coil set (green line). Here the relative axial sensitivity is plotted in dependence on *z* relative to the half of the length *a* of the coil system. Note the rapid decay of the sensitivity outside of the coil system for the case of the compensated coil in comparison to the Helmholtz coil system.

Coil systems with different technical data than the standard compensated coils can be manufactured on request. Please contact us for detailed information.

MAGNET-PHYSIK Dr. Steingroever GmbH
Emil-Hoffmann-Straße 3, 50996 Köln, Germany
Phone: +49 2236 3919-0 ▪ Fax: +49 2236 3919-19
info@magnet-physik.de
www.magnet-physik.de

MAGNET-PHYSICS Inc.
6330 East 75th Street, Suite 224, Indianapolis, IN 46250, USA
Phone: +1 317 577 8700 ▪ Fax: +1 317 578 2510
info@magnet-physics.com
www.magnet-physics.com

