LABORATORIO ELETTROFISICO

HELMHOLTZ COIL - SINGLE AXIS

The simple, economical solution that never goes out of style

The Helmholtz coil refers to the arrangement of two identical conductor loops spaced one radius apart and wound so that the current flows through both coils in the same direction. This winding generates an almost homogeneous magnetic field in the center of the structure with the primary component parallel to the axes of the two coils. Measurement of magnetic moment with a Helmholtz coil is a convenient way to test permanent magnet materials. Other values such as operating flux density (Bd), operating field strength (Hd), coercive force (Hc), residual flux density (Br), and maximum energy product (BHmax) can be derived from the measured moment value.

The Helmholtz coils can be single-axis (one coil pair) or 3-axis (three coil pairs at 90 degrees from each others). The triple-axis version lets you fully characterize the magnitude and the direction of the magnetization with respect to the axes, regardless of how you place the magnet. The complete measurement system consists of a single axis Helmholtz coil set, a cabinet containing one fluxmeter and a PC. Detailed specs are listed in the following.

KEY BENEFITS

- Easy to use
- Low cost
- Precise and accurate
- Non-destructive method of testing
- Feedback control for calibration and magnetization system
- Control of permanent magnets quality (Br): operating flux density (Bd), operating field strength (Hd), coercive force (Hc), residual flux density (Br), and maximum energy product (BHmax)
- Meets international standards (IEC 60404-14)

HOW IT WORKS

When connected to a fluxmeter, the Helmholtz coil provides an output flux Φ proportional to the magnetic moment M of the sample: $M=K_H \Phi$ where K_H is the coil's constant (each coil is provided with its own certified constant). This measurement procedure is described in the International Standard IEC 60404-14.

AXIAL MAGNETIC POLARIZATION

axial: $J = \frac{K_H \cdot Ø}{V}$

RADIAL MAGNETIC POLARIZATION

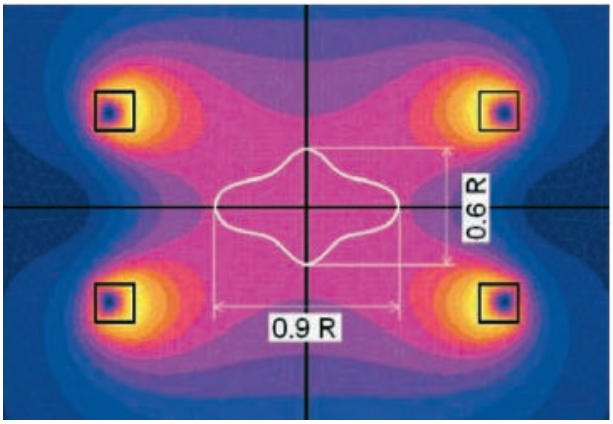
$J = \frac{K_H \cdot Ø}{V} \cdot \frac{\alpha}{\sin\alpha}$ (α in radiant)

HOW TO MEASURE

How to choose the right Helmholtz coil size

The large volume with field uniformity in the center of the Helmholtz coils is approximately an ellipsoid having a major axis of 0.93 R and a minor axis of 0.62 R. The magnet to be measured should fit within this volume to have the best reading accuracy (uniformity within 1%).

The resulting Helmholtz coil measurement is an intrinsic quantity (the magnetic moment) of the sample that can be used as the reference criteria for cross-comparison (between suppliers, customers, etc) and quality control (QC).



MODELS AVAILABLE

Models	Diameter	K_H (typical)	Measurement Volume
HM/R15	32 mm (1.18″)	$4.5 \cdot 10^{-5}$ m	12 mm (0.47″) - H 9 mm (0.35″)
HM/R32	64 mm (2.52″)	$1.1 \cdot 10^{-4}$ m	29 mm (1.14″) - H 19 mm (0.75″)
HM/R58	116 mm (4.57″)	$4.5 \cdot 10^{-4}$ m	53 mm (2.086″) - H 34 mm (1.338″)
HM/R100	200 mm (7.87″)	$2.8 \cdot 10^{-3}$ m	90 mm (3.543″) - H 60 mm (2.362″)
HM/R150	300 mm (11.81″)	$7.3 \cdot 10^{-3}$ m	135 mm (5.314″) - H 90 mm (3.543″)
HM/R250	500 mm (19.69″)	$8.8 \cdot 10^{-3}$ m	225 mm (8.86″) - H 500 mm (19.7″)

Size 32/58/100 always in stock.
Customized models are also available upon request.

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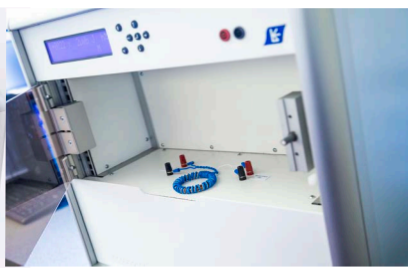

Founded in 1959, Laboratorio Elettrofisico is a global company specializing in engineering, designing, and manufacturing the world's most precise magnetizing and magnetic measuring equipment. Headquartered in Milan, LE has laboratories, testing facilities, support staff, and services centers in the United States, India, and China.

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