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HCS-01 Three-Axis Helmholtz Coil Magnetic Field Sources

Precision Three-Axis Magnetic Field Source

The HCS-01 three-axis Helmholtz coil magnetic field source family generates uniform, accurate and precise magnetic fields in a volume about the center of the coil system. The size of the control volume depends on the size of the coils. MEDA offers three standard coil sizes: 1, 2 and 4 meter side lengths.

The HCS-01 can be configured as an open loop or closed loop system. In the closed loop system a three-axis control magnetometer, in conjunction with bipolar power supplies form a closed loop that automatically nulls the field in the control volume. Control currents are passed through precision coils wound about each sensor axis to generate accurate and stable uniform fields within the control volume.

In the open loop system, fixed currents are passed through the coils to produce a coarse null in the control volume. The null is trimmed to its final value under computer control. Precision control currents are added to the fixed currents to generate accurate and stable uniform fields within the control volume.

Both configurations include a computer interface and program that manages the trimming of the control volume null and the application of magnetic fields.

HCS-01 applications include magnetic sensor calibration, active shielding, permanent and induced magnetic properties measurements and research into the biological effects of magnetic fields.

The HCS-01 2-meter closed loop system specification on the next page is typical of the performance that can be expected.



Features

- Three Square Concentric Orthogonal Helmholtz Coils.
- Open or Closed Loop Configuration.
- 1 nT Control Volume Null.
- $\pm 200,000$ nT Control Field Range.
- 1 nT Control Field Resolution.
- 0.05% Basic Accuracy.

For more information

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SPECIFICATIONS**Generated Field**

<i>Maximum Range</i>	$\pm 270,000$ nT
<i>Control Range</i>	$\pm 199,999$
<i>Resolution</i>	1.0 nT
<i>Accuracy @ 23° C</i>	$\pm 0.05\%$ of setting
<i>Field Uniformity</i>	Coil produced gradient is $< 0.1\%$ of applied field within a 13.9 inch diameter sphere about coil center

Field Stability

<i>Temperature Coefficient</i>	$\pm (1.25\text{ppm of FS} + 50\text{ppm of setting})/^{\circ}\text{C}$
<i>Long Term Drift at constant temperature</i>	$\pm (3\text{ppm of FS} + 15\text{ppm of setting})/\text{month}$ $\pm 200\text{ppm of setting}/\text{year}$

Null Field

<i>Resolution</i>	1.0 nT
<i>Stability</i>	± 10 nT for 24 hours @ constant temperature ± 25 nT/month @ constant temperature

Magnetic Axis Orthogonality

<i>Open Loop</i>	± 1.0 degree maximum
<i>Closed Loop</i>	± 0.1 degree maximum

Coil Properties

<i>X Coil Outside Dimensions</i>	77.5" square
<i>Y Coil Outside Dimensions</i>	75.0" square
<i>Z Coil Outside Dimensions</i>	80.0" square
<i>Overall Coil Size</i>	80" x 80" x 82"
<i>Weight</i>	Approximately 350 lbs.

Control Unit

<i>Size</i>	22.06" W x 34.12"H x 26.4"D
<i>Weight</i>	Approximately 350 lbs.

Power Requirements

<i>Voltage</i>	115 VAC @ 60 Hz
<i>Current</i>	30 Amperes maximum

Temperature

<i>Operating</i>	0° C to 50° C
<i>Storage</i>	-62° C to +71° C