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HCS-01 Three-Axis Helmholtz Coil Magnetic Field Source

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: 2-meter, 3-meter and 4-meter side lengths.

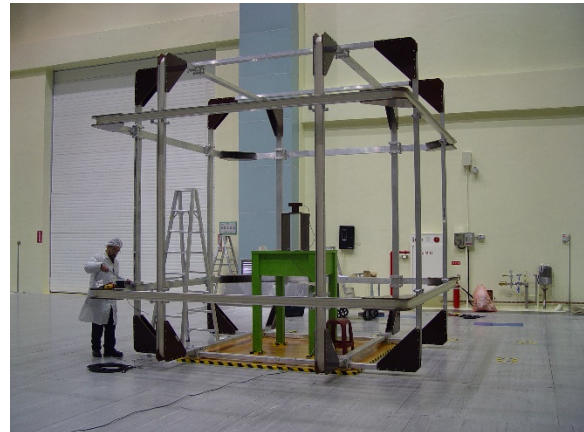
The HCS-01 can be operated as an open loop or closed loop system. In the closed loop system a three-axis control magnetometer, in conjunction with bipolar power supplies, form a closed loop that automatically nulls the field in the control volume. Control currents are passed through precision coils wound 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.

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, magnetic cleanliness testing and research into the biological effects of magnetic fields.

The HCS-01 2, 3 and 4-meter closed loop system specifications are listed on the next three pages.



Features

- Three Square Concentric Orthogonal Helmholtz Coils
- Open or Closed Loop Configuration
- 1 nT Control Volume Null
- $\pm 200,000$ nT Control Field Range
- Control Field Resolution
 - 0.4 nT: $\pm 10,000$ to $\pm 200,000$ nT Range
 - 0.02 nT: 0 to $\pm 10,000$ nT Range
- 0.05% Basic Accuracy
- Remotely control the system with the standard SCPI syntax used by most instruments.

For more information

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HCS01CL-2m SPECIFICATIONS– 2 METER (6')

Generated Field

<i>Maximum Range</i>	$\pm 270,000$ nT
<i>Control Range</i>	$\pm 199,999$ nT
<i>Resolution</i>	0.4 nT (10,000 to 200,000 nT Range) 0.02 nT (0 to 10,000 nT Range)
<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 or Closed Loop</i>	± 0.1 degree maximum
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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 20 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>	-20° C to +60° C

HCS01CL-3m SPECIFICATIONS – 3 METER (9')**Generated Field**

<i>Maximum Range</i>	$\pm 270,000$ nT
<i>Control Range</i>	$\pm 199,999$ nT
<i>Resolution</i>	0.4 nT (10,000 to 200,000 nT Range) 0.02 nT (0 to 10,000 nT Range)
<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 19.2 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 or Closed Loop</i>	± 0.1 degree maximum
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Coil Properties

<i>X Coil outside dimensions</i>	106.0" square
<i>Y Coil outside dimensions</i>	103.5" square
<i>Z Coil outside dimensions</i>	108.5" square
<i>Overall Coil Size</i>	106" x 106" x 113"
<i>Weight</i>	Approximately 525 lbs.

Control Unit

<i>Size</i>	22.06" W x 34.12"H x 26.4" D
<i>Weight</i>	Approximately 20 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>	-20° C to +60° C

HCS01CL-4m SPECIFICATIONS – 4 METER (12')

Generated Field

<i>Maximum Range</i>	±270,000 nT
<i>Control Range</i>	±199,999 nT
<i>Resolution</i>	0.4 nT (10,000 to 200,000 nT Range) 0.02 nT (0 to 10,000 nT Range)
<i>Accuracy @ 23° C</i>	±0.05% of setting
<i>Field Uniformity</i>	Coil produced gradient is <0.1% of applied field within a 27.4 inch diameter sphere about coil center

Field Stability

<i>Temperature Coefficient</i>	±(1.25ppm of FS + 50ppm of setting)/°C
<i>Long Term Drift at constant temperature</i>	±(3ppm of FS + 15ppm of setting)/month ±200ppm of setting/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>	±0.1 degree maximum
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Coil Properties

<i>X Coil Outside Dimensions</i>	153.0" square
<i>Y Coil Outside Dimensions</i>	148.0" square
<i>Z Coil Outside Dimensions</i>	160.0" square
<i>Overall Coil Size</i>	155" x 155" x 160"
<i>Weight</i>	Approximately 700 lbs.

Control Unit

<i>Size</i>	22.06" W x 34.12"H x 26.4"D
<i>Weight</i>	Approximately 20 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>	-20° C to +60° C