SCHLÖDER
EMV-Systeme & Komponenten

MGA_HCS_125-75
MGA_HCS_100-60
MGA_HCS_50-28
MGA_HCST_50-28

Helmholtz Coils

A Helmholtz coil consists of two identical wound coils, which are electrically connected in series and placed symmetrically along a common axis. The special feature is the large homogeneity of the magnetic field in the middle between the two coils.

MGA_HCS_100-60 (1 axis)

MAG_HCST_50-28 (3 axis)

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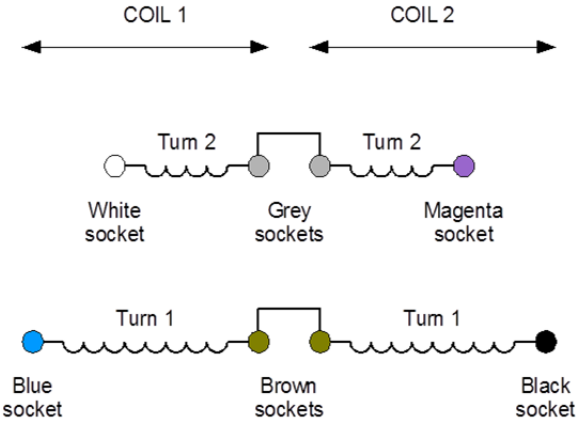
Helmholtz coil arrangements of greater complexity can produce interference fields in different spatial axes. In the case of 3-axis Helmholtz coils, three coil pairs are arranged in the X, Y and Z directions. By means of a suitable control unit, the test specimen can thus be fully exposed to the interference field over a wide frequency range in all three spatial axes.

If the geometry is fixed, the magnitude of the magnetic field is directly proportional to the number of windings and the applied current. When designing the coils it is attempted, on one hand, to provide the highest possible number of windings in order to keep the necessary current (and thus the amplifier power) small. On the other hand, a high number of windings at higher frequencies (the MIL-STD-461E requires, for example, tests up to 100 kHz) leads to large coil impedances which, in turn, result in impractically high amplifier output voltages.

Since the required field strength decreases with increasing frequency (for the MIL-STD-461E mentioned above, the required test level at 100 kHz falls to less than one thousandth of the output value at 60 Hz), the ideal solution is the construction of a Helmholtz coil with two separate windings as in the MGA_HCS Helmholtz coils. The basic design is shown in the following figure:



If the output of a power amplifier is connected to the "blue" and "black" jacks, a Helmholtz coil with a high coil factor is available, ideal for generating high field strengths at low frequencies where the coil inductance is not yet important.
If the output of a power amplifier is connected to the "white" and "magenta" jacks, a low inductance Helmholtz coil is available, ideal for generating medium field strengths at higher frequencies.

General structure of MGA_HCS Helmholtz coils
The Helmholtz coils of the MGA_HCS series are completely made of wood materials. There are no metallic parts other than wire and connectors. The coils are completely clad with a durable laminate - the wire is not visible and thus protected against damage.

Type	Helmholtz coil MGA_HCS_50-28	Helmholtz coil MGA_HCS_100-60	Helmholtz coil MGA_HCS_125-75	Helmholtz coil MGA_HCST_50-28
Number of axis	1	1	1	3
Frame lenght [cm]	50	100	125	50 / 46 / 42
Number of turns (each coil)	26 + 4	44 + 10	50 + 10	26 + 4
Distance between coils [cm]	28	60	75	28
Coil factor [m^{-1}] (typical)	65.9 / 11.2	62.1/ 13.4	47.5 / 10.3	X-Axe: 66.1 / 11.3 Y-Axe: 67.8 / 11.8 Z-Axe: 69.1 / 12.2
DC Resistance [Ω] (typical)	0.63 / 0.15	2.27 / 0.43	9.8 / 2.0	X-Axe: 0.58 / 0.10 Y-Axe:0.53 / 0.09 Z-Axe: 0.48 / 0.08
Inductivity [mH] (typical)	1.73 / 0.07	15.8 / 0.65	16.4 / 1.0	X-Axe: 1.73 / 0.07 Y-Axe: 1.52 / 0.06 Z-Axe: 1.33 / 0.05
Resonant frequency [kHz]	>700	>150	>150	>700
Continuous current / short-time current [A]	16 / 20	16 / 20	5 / 7	16 / 20

The scope of supply of the Helmholtz coils includes a cable set (3m length) which is designed for maximum current.