MGA HCS XX

Helmholtz coils

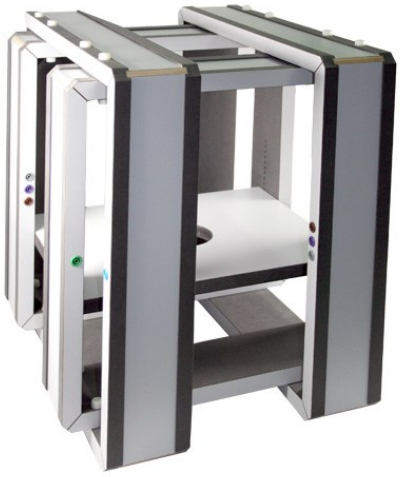
MIL-STD-461E, SAE J1113-22, Automotive a.o.

- Available in different versions:

  MGA HCS 50-28:
  1 axe, frame length: 50 cm,
  height adjustable support plate,
  with two separate windings

  MGA HCST 50-28: 3 axes, 50 cm
  MGA HCS 100-60: 1 axe, 100 cm
  MGA HCS 125-75: 1 axe, 125 cm

- Metal-free construction
- For generating magnetic fields with field strengths > 1000 A/m
- DC fields up to 1000 A/m are achievable in the combination HCS(T) 50-28/MGA 1033



MGA HCST 50-28
(3 axes)

Available from 1 to 3 axes with different numbers of windings and frame lengths.

MGA HCS 50-28
(1 axe)

MGA HCS 100-60
(1 axe)

MGA HCS 125-75
(1 axe)

Overview

A Helmholtz coil consists of two identically wound coils electrically connected in series and symmetrically arranged along a common axis. The special feature is the large homogeneity of the magnetic field in the center between the two coils. Larger Helmholtz coil arrangements can generate interference fields in different spatial axes.

For fixed geometry, the magnitude of the magnetic field is directly proportional to the number of turns and the applied current. When designing the coils, an attempt is made on the one hand to provide as large a number of windings as possible in order to keep the necessary current (and thus the amplifier power) low.

On the other hand, a large number of windings at higher frequencies (MIL-STD-461, for example, requires tests up to 100 kHz) leads to large coil impedances, which in turn lead to impractically high amplifier output voltages.

Since the required field strength decreases with increasing frequency (for the MIL-STD-461 mentioned above, the required test level at 100 kHz drops to less than one-thousandth of the output value at 60 Hz), the ideal solution is to design a Helmholtz coil with two separate windings, see “Structure of the Helmholtz coils”.

The Helmholtz coils of the HCS series are made entirely of wood materials. Apart from wire and connection sockets, no metal parts are included. The coils are completely covered with a durable laminate - the wire is not visible and thus protected from damage.

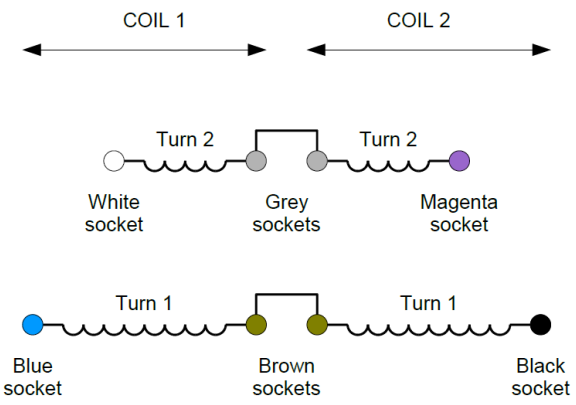
MGA HCS XX

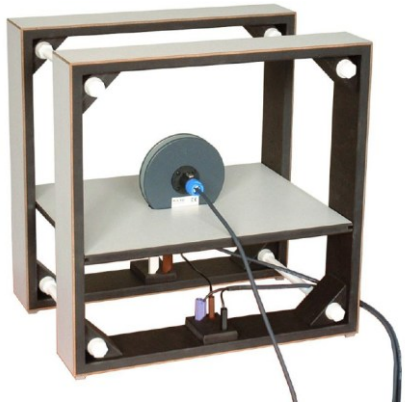
Helmholtz coils

Structure of the Helmholtz coils

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

When the output of a power amplifier is connected to the "white" and "magenta" sockets, a Helmholtz coil with low inductance is available, ideal for generating medium field strengths at higher frequencies.



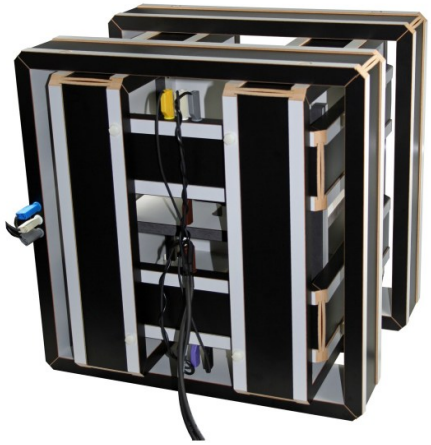


MGA HCS 50-28 with sensor coil
MGA RLS 133 with wiring

Three-axis Helmholtz coils

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

The start of the 1st winding is marked on the X-axis with the blue socket (see fig.). The Y-axis is provided with a green socket at this point, the Z-axis with the yellow socket.



MGA HCST 50-28 with wiring
(3 axes – black version)

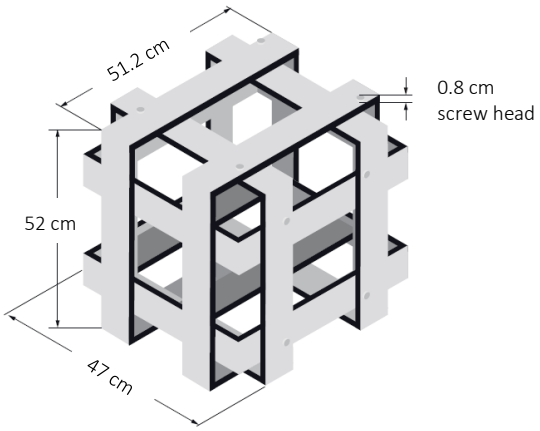
MGA HCS XX

Helmholtz coils

Technical data

Helmholtz coil MGA	HCS 50-28	HCS 100-60	HCS 125-75	HCST 50-28
Number of axes	1	1	1	3
Frame length	50 cm	100 cm	125 cm	50 / 46 / 42 cm
Number of turns per coil	26 + 4	44 + 10	40 + 10	26 + 4
Coil spacing	28 cm	60 cm	75 cm	28 cm
Coil factor [m^{-1}] (typical)	65.9 / 11.2	62.1 / 13.4	41.49 / 10.46	X-Axe: 66.1 / 11.3 Y-Axe: 67.8 / 11.8 Z-Axe: 69.1 / 12.2
DC resistance (typical)	0.63 / 0.15 Ω	2.27 / 0.43 Ω	2.38 / 0.55 Ω	X-Axe: 0.58 / 0.10 Ω Y-Axe: 0.53 / 0.09 Ω Z-Axe: 0.48 / 0.08 Ω
Inductance (typical)	1.73 / 0.07 mH	15.8 / 0.65 mH	13.78 / 1.0 mH	X-Axe: 1.73 / 0.07 mH Y-Axe: 1.52 / 0.06 mH Z-Axe: 1.33 / 0.05 mH
Resonant frequency	> 700 kHz	> 150 kHz	> 150 kHz	> 700 kHz
Rated current / Short term current	16 / 20 A	16 / 20 A	16 / 20 A	16 / 20 A
Load capacity of the shelf	50 kg (statically)			

Dimensions (3 axes– *Dimensions may vary*)



Scope of delivery

- Cable set, 3 m length (designed for maximum current)
- Calibration certificate

All information regarding appearance and technical data correspond to the current state of development at the time of release of this data sheet. We reserve the right to make technical changes. 252502