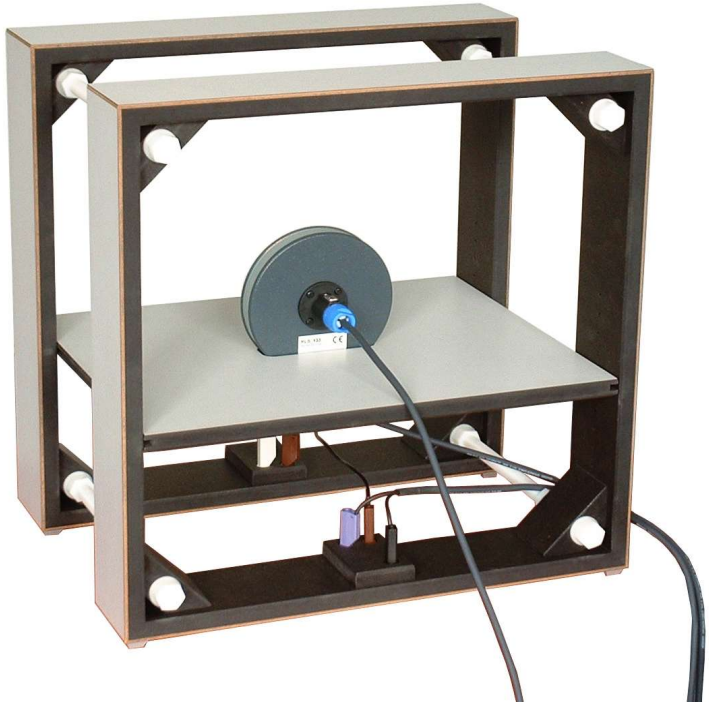
Coils
Loop sensors / radiating loops / Helmholtz coils

Loop sensors / radiating loops: page 2



Helmholtz coils: page 6

Coils according to MIL-STD-461E
Loop sensor / radiating loop

- LS_040: Electrostatically shielded loop sensor according to MIL-STD-461E
- RL_120: 120mm radiating loop according to MIL-STD-461E
- LS_133: Electrostatically shielded loop sensor according to MIL-STD-461E

***LS_040** with connecting cable*

***RL_120** with connecting cable*

*For calibration purpose the **LS_040** is attached onto the **RL_120**.*
The distance of 5 cm between radiating loop and field monitoring loop is guaranteed automatically.

***LS_133** with connecting cable*
Positioning facility with 3 polymer threaded rods at the front side.

Coil according to EN 55103-1/2
Loop sensor / radiating loop

- **RLS_133**: Electrostatically shielded loop sensor according to EN 55103-1/2. For economical reasons this coil is used as radiating loop and loop sensor as well.

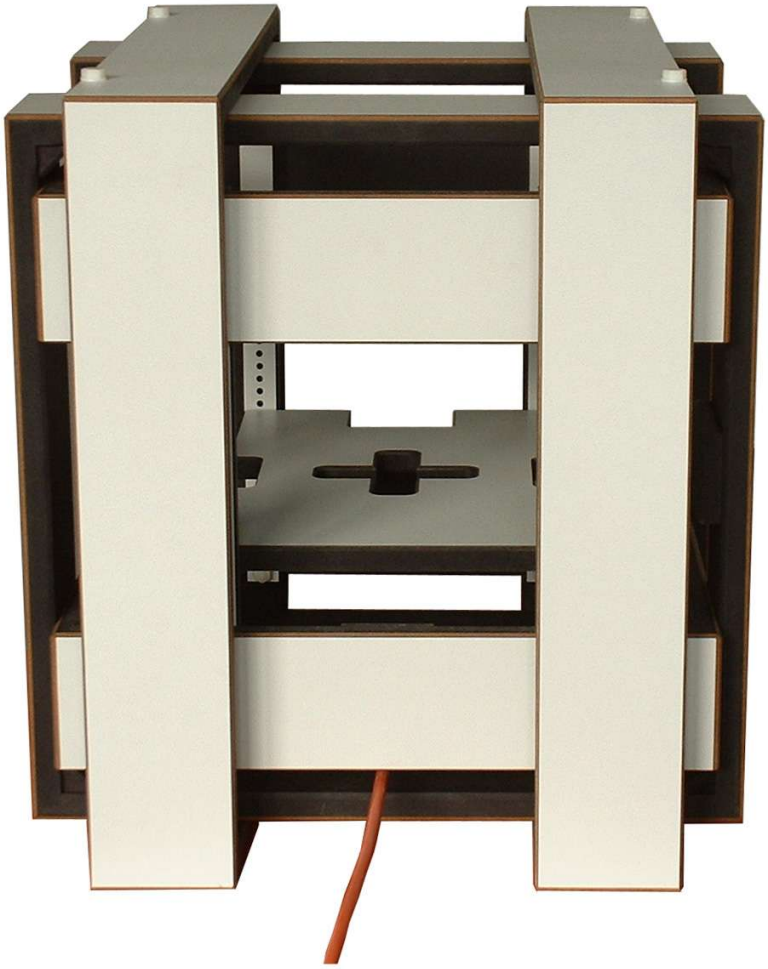
***RLS_133** with connecting cable*
Positioning facility with 3 polymer threaded rods at the front side.

Specifications

Model	*LS_040*	*RL_120*	*LS_133*	*RLS_133*
Type:	Loop sensor	Radiating loop	Loop sensor	Loop sensor / radiating loop
Standard:	MIL-STD-461E RS101	MIL-STD-461E RS101	MIL-STD-461E RE101	EN 55103-1/2
Diameter:	40 mm	120 mm	133 mm	133 mm
Body material:	PVC	MDF	MDF	MDF
Wire:	7-41 Litz wire	2,0mm Magnet wire	7-41 Litz wire	0,25 mm² Litz wire
Number of turns:	51	20	36	36
Number of layers:	1	4	4	4
Shielding:	Elektrostatic	none	Elektrostatic	Elektrostatic
Distance to EUT:	5 cm	5 cm	7 cm	10 cm / 5 cm
Connector at coil:	Speakon	4 mm MC socket	Speakon	Speakon
Connector at cable:	XLR	4 mm MC plug	XLR	XLR / 4 mm MC plug
Coil factor (50 mm):	---	76,3 1/m	---	138,5 1/m
Correction factor:	see calibration sheet (50 Ω / 600 Ω / 1MΩ)	---	see calibration sheet (50 Ω / 600 Ω / 1MΩ)	see calibration sheet (50 Ω / 600 Ω / 1MΩ)
DC resistance:	~ 4,5 Ω	~ 0,05 Ω	~ 10 Ω	~ 1,1 Ω
Inductance:	~ 130 µH	~ 120 µH	~ 340 µH	~ 340 µH
Resonant frequency:	---	> 1,8 MHz	---	> 0,9 MHz
Frequency range:	10 Hz - 1 MHz	DC - 500 kHz	10 Hz - 1 MHz	DC / 10 Hz - 500 kHz
Nominal current:	---	15 A	---	5 A
Connecting cable:	Microphone cable	Litz wire 2 x 1,5mm²	Microphone cable	Microphone cable / Litz wire 2 x 1,5mm²
Volume of delivery:	Coil LS_040 Cable, 3m Calibration sheet	Coil RL_120 Cable, 3m Calibration sheet	Coil LS_133 Cable, 3m Calibration sheet	Coil RLS_133 2 Pcs. Cable á 3m Calibration sheet

Helmholtz Coils

for susceptibility tests



HCST_50/28_TAP
Tapped triaxial Helmholtz coil

- **Tapped single axis and triaxial Helmholtz coils**
- **For immunity tests according to MIL-STD-461E, EN 55103-2, SAE J1113-22 etc.**
- **Tapped single layer winding resulting in large coil factors for tests with low frequencies and low inductance for tests with high frequencies.**
- **For the generation of magnetic fields with field strength > 1000 A/m**

General

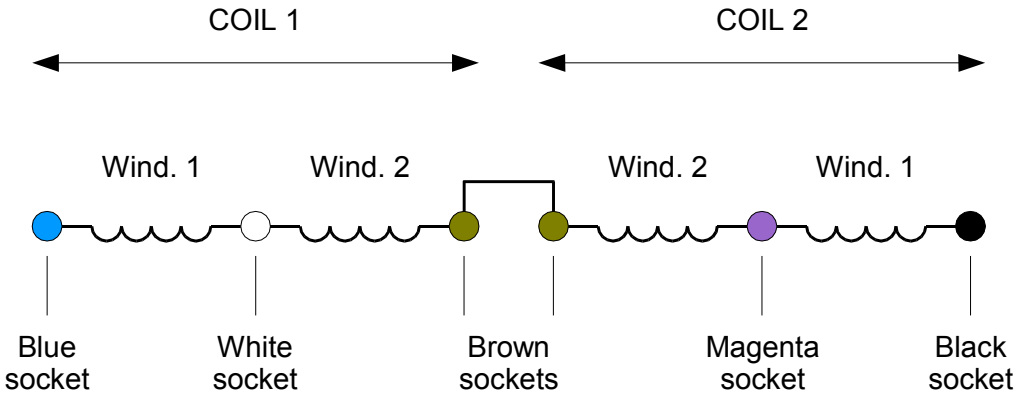
The typical single axis Helmholtz coil system consists of two identical wound coils, wired in series. The magnetic field between and in the center of the coils is extremely uniform.

At fixed dimension the strength of the magnetic field generated is directly proportional to the number of turns in the coils and the current applied to them.

A high number of turns leads to a high coil factor. The higher the coil factor, the lower the current (and thus the amplifier power) to maintain a specific field strength.
However, if higher frequencies are required (e.g. MIL-STD-461E requires 100 kHz), the coil impedance will require impracticable high driving voltages to drive enough current through the coil in order to reach the desired field intensity.

It is a common feature of all immunity standards that the required field intensity decreases with increasing frequency. The afore mentioned MIL-STD-461E e.g. requires 1000 µT at 60 Hz and 0,63 µT at 100 kHz.

The best solution to bypass these problems is the construction of tapped Helmholtz coils. The basic design is shown in the subsequent drawing.

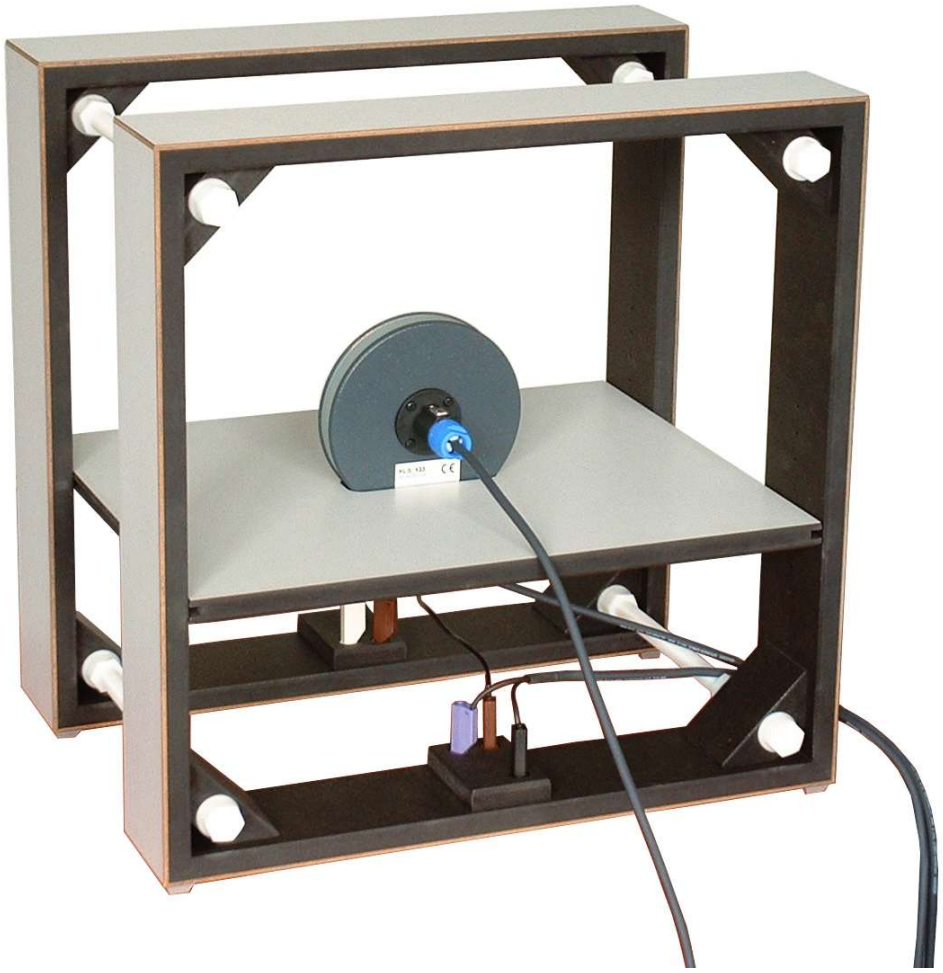


Connecting the output of a power amplifier to the blue socket and black socket leads to a Helmholtz coil with a high coil factor - best for the generation of high field strength at low frequencies, where the coil inductance has no or little influence.

Connecting the output of a power amplifier to the white socket and magenta socket leads to a Helmholtz coil with low inductance - best for the generation of medium field strength at high frequencies.

With Helmholtz coil configurations of greater complexity the disturbing magnetic fields are generated in different directions. Systems that consist of three coil pairs (triaxial Helmholtz coil) generate the magnetic vector in the X-, Y- and Z-direction.

With a corresponding generator/analyzer it is possible to control the EUT fully automated across a wide frequency range without the need to turn it.



HCS_50/28_TAP
Helmholtz coil with loop sensor RLS_133

General assembly of HCS coils

Helmholtz coils of the HCS series are constructed completely of wooden materials. Metallic components are limited to the copper wire and electrical connectors.

The copper wire is covered with heavy duty laminate. The wire is not visible and therefore protected against damaging.

The volume of delivery contains cabling (length 3 m) designed for the maximum current rating of the coils.

Specifications

(All coils are customized so the subsequent data are only exemplary.)

Model	*HCS_50/28_TAP*	*HCS_100/60_TAP*	*HCST_50/28_TAP*
Type	Monaxial	Monaxial	Triaxial
Dimension [cm]	50	100	50 / 46 / 42
Number of turns (per coil)	22 + 4	44 + 10	22 + 4
Coil separation [cm]	28	60	28
Coil factor [m^{-1}]	65,9 / 11,2	61,3 / 10,3	X-axis: 66,1 / 11,3 Y-axis: 67,8 / 11,8 Z-axis: 69,1 / 12,2
Total resistance DC [Ω]	0,63 / 0,15	10,5/2,0	X-axis: 0,58 / 0,10 Y-axis: 0,53 / 0,09 Z-axis: 0,48 / 0,08
Total inductance [mH]	1,73 / 0,07	6,2 / 1,2	X-axis: 1,73 / 0,07 Y-axis: 1,52 / 0,06 Z-axis: 1,33 / 0,05
Resonant frequency [kHz]	> 150 kHz	> 150 kHz	> 150 kHz
Rated current [A]	16	16	16
Short term current [A]	20	20	20

Frankonia EMC-Test-Systems GmbH
Daimlerstr. 17
91301 Forchheim / Germany

TEL: ++49-(0)9191-73666-0
FAX: ++49-(0)9191-73666-20
info@frankonia-emv.com
www.frankoniagroup.com