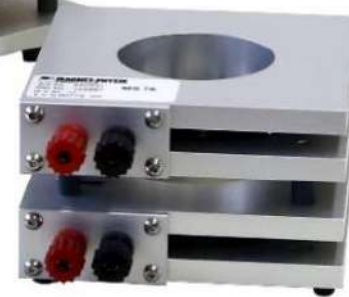


## Helmholtz coils



MS 210



MS 75



MS 150

## • Description

As a passive measuring coil connected to a fluxmeter, the Helmholtz coil enables measurements of the magnetic dipole moment according to IEC 60404-14. The measurements of the magnetic dipole moment is a fast, precise absolute part inspection for the quality control of magnets. The magnets can have any geometric shape, only a dipole magnetization is required. The magnetization state of the test specimens is not changed by the measurement. The measuring principle can be applied to all ferromagnetic materials. The coil bodies of the MS 20, MS 75, MS 150 and MS 210 coils are milled from solid aluminum and are of extremely high quality and robust. Each coil is measured in our DAkkS accredited calibration laboratory before delivery. The coil constant (sensitivity) determined in this way is documented in a DAkkS calibration certificate and also noted on the coil. The coils are available with universal laboratory plugs (bunch plugs), or with a Sub-D plug for connection to the EF 5, EF 6, EF 7 and EF 14 Magnet-Physik fluxmeters. The sensitivity of the measuring coil, determined by DAkkS calibration, is stored in the memory contained in the plug and is automatically read out when connected to the Magnet-Physik fluxmeter. Manual input of coil data into the meter is not required. Due to the robust design of the coils, the calibration values are very stable over time. An adjustable sample holder in the form of a solid arm is integrated in the MS 75, MS 150 and MS 210 coils.



Fluxmeter EF 6, MS 75, ME 7

Coils in the Helmholtz arrangement are generally known as active coils for generating very homogeneous magnetic fields. Insofar as the conductor cross-section of the coils permits, they can be used to generate homogeneous magnetic fields by active energization. Due to the very precisely known coil constant and the likewise precisely measurable coil current, the generated magnetic field is known very precisely. Thus, Helmholtz coils are used as metrological reference and for the calibration of sensors.



EF 7 (3-Channel version) MS 300-3

In addition to the 1-axis coils, we offer coils with up to three axes, which allow simultaneous measurement of the dipole moment in all three orthogonal spatial axes and thus the calculation of the angular error of a magnet. Use the 3-axis coils with a 3-Channel Fluxmeter EF 7. This setup can automatically calculate the vector sum of the magnetic dipole moment and the vector angle. Furthermore, with 3-axis coils it is possible to generate a defined magnetic field in any direction. This is of interest for testing and calibration of sensors, or for compensation of external magnetic fields.


Another special feature of our product range are the stray field compensated coils, which in contrast to the conventional Helmholtz coils are not sensitive to the magnetic environment outside the coil. These are excellent for use in an industrial environment (production line), or where the highest accuracy is required. Conventional coils must be operated at least one meter away from magnetic or magnetizable material.

• **Moment Coils (Helmholtz Coils)**

The MS 150, MS 210, MS 237, MS 534, MS 990 x 990 and MS 600-3 coils are also suitable for generating magnetic fields.

MS Series for measuring the magnetic moment and dipole moment of permanent magnets	MS 20	MS 75	MS 150	MS 210	MS 237	MS 534	MS 990 x 990
Measuring constant	0.00022 cm	0.0078 cm	0.015 cm	0.014 cm	0.25 cm	0.42 cm	1.5 cm
Field strength constant	---	---	67 (A/cm)/A	71 (A/cm)/A	4.0 (A/cm)/A	2.4 (A/cm)/A	0.67 (A/cm)/A
Flux density constant	---	---	8.4 mT/A 84 G/A	9.0 mT/A 90 G/A	0.50 mT/A 5.0 G/A	0.30 mT/A 3.0 G/A	0.08 mT/A 0.8 G/A
Resistance	6650 Ω	77 Ω	37 Ω	75 Ω	3 Ω	7 Ω	13 Ω
Free pass-through	18 mm	65 mm	140 mm	200 mm	140 mm	275 mm	984 mm
Limits for 1 % accuracy							
Max. magnet height	5 mm	30 mm	50 mm	70 mm	70 mm	150 mm	220 mm
Max. diameter	10 mm	31 mm	70 mm	94 mm	110 mm	260 mm	160 mm

### • 3-Axis Moment Coils

MS series other coil sizes see article overview below	<b>MS 600-3</b> 
Measuring constant	0.42 cm
Field strength constant	2.4 (A/cm)/A 3.0 G/A
Resistance	7 Ω - 10 Ω
Free pass-through from top	270 mm
Volume for 1% accuracy	150 mm diameter

### • Stray Field Compensated Moment Coils

MSK series other coil sizes see article overview below	<b>MSK 101</b> 
Measuring constant	0.0165 cm
Field strength constant	6.05 (kA/m)/A
Resistance	290 Ω
Free pass-through from top	140 mm
Dimensions for 1% accuracy	
Max. Magnet height	160 mm
Max. Diameter	160 mm

### • Ordering Information

All coils are available with connector plugs with data memories. These allow coil data to be transferred to EF 5, EF 6, EF 7 and EF 14 electronic fluxmeters so that they are automatically configured. Alternatively, the coils are available with bunch plugs. Please specify the connector type when ordering.

The numerical values given are the nominal values. The exact values of the winding areas, constants and resistances are determined for each coil by a calibration.



SUB-D connector for EF 5, EF 6, EF 7 EF 14



Plug with bunch contacts

## • Overview and Ordering Information

Item no.	Designation	Axes	Connection	Meas. Const. [cm]	R [Ohm]	Free Diameter [mm]	Stray Field-comp.	Max. Magnet Size for 1% accuracy		Magnetic Field Generation		
								Height [mm]	Diameter [mm]	DC	AC	Required Power Supply
100534	MS 20	1	Bunch Plug	0.00022	6650	18	-	5	10	-	-	-
200534	MS 20	1	Sub-D	0.00022	6650	18	-	5	10	-	-	-
100531	MS 75	1	Bunch Plug	0.0078	77	65	-	30	31	-	-	-
200531	MS 75	1	Sub-D	0.0078	77	65	-	30	31	-	-	-
100530	MS 150	1	Bunch Plug	0.015	37	140	-	50	70	4.3 mT	-	0.52 A / 19.2 V
200530	MS 150	1	Sub-D	0.015	37	140	-	50	70	4.3 mT	-	0.52 A / 19.2 V
100532	MS 210	1	Bunch Plug	0.014	75	200	-	70	94	3.2 mT	-	0.37A / 27.4 V
200532	MS 210	1	Sub-D	0.014	75	200	-	70	94	3.2 mT	-	0.37A / 27.4 V
801031	MS 237	1	Bunch Plug	0.25	3	140	-	70	110	1.0 mT	1.0 mT max. 42 kHz	2 A / 5.8 V
280562	MS 237	1	Sub-D	0.25	3	140	-	70	110	1.0 mT	1.0 mT max. 42 kHz	2 A / 5.8 V
280677	MS 534	1	Bunch Plug	0.42	7	275	-	150	260	0.6 mT	0.6 mT max. 14 kHz	2 A / 13.8 V
280512	MS 534	1	Sub-D	0.42	7	275	-	150	260	0.6 mT	0.6 mT max. 14 kHz	2 A / 13.8 V
280663	MS 990 x 990	1	Bunch Plug	1.5	13	984	-	220	160	0.073 mT	-	0.88 A / 11.4 V
280286	MS 990 x 990	1	Sub-D	1.5	13	984	-	220	160	0.073 mT	-	0.88 A / 11.4 V
280462	MSK 101	1	Sub-D	0.0165	290	140	yes	160	160	1.54 mT	Not specified.	0.2 A / 60 V
280673	MSK 100	1	Sub-D	0.0213	100	60	yes	54	54	0.96 mT	Not specified	0.16 / 16 V
280674	MSK 105	1	Sub-D	0.0134	55	30	yes	32	32	2.44 mT	Not specified	0.26 A / 15 V
280675	MSK 102	1	Sub-D	0.0163	540	140	yes	160	160	1.15 mT	Not specified	0.15 A / 80V
280514	MS 300 - 2 axis	2										
280602	MS 300 - 3 axis	3	Sub-D	0.25	3		-	70	70	1.0 mT	1.0 mT max. 42 kHz	2 A / 5.8 V
280670	MS 300 - 3 axis	3	Sub-D	0.02			-	70	70	-	-	-
280529	MS 600 - 3 axis	3	Sub-D	0.42	10	270	-	150	150	0.6 mT	0.6 mT 10 – 14 kHz	2 A / 18.5 V
801050	MS 600 - 3 axis	3	Bunch Plug	0.42	10	270	-	150	150	0.6 mT	0.6 mT 10 – 14 kHz	2 A / 18.5 V

• **References for Helmholtz coils - Magnetic Moment Etalons ME 7, ME 8, ME 9**

Magnetic moment etalons are reference magnets for the quantity Magnetic Dipole Moment. The common use is the calibration of moment measuring coils (Helmholtz-Coils).

The magnetic moment etalons ME 7, ME 8 and ME 9 excel in a very low temperature coefficient and high long-term stability.



Model	Diameter	Height	Temperature coefficient	Magnetic Dipole Moment	Optimized for MPS Coils
ME 7	31.8 mm	12 mm	- 0.001 %/K	$8 \cdot 10^{-6} \text{ Vs} \cdot \text{cm}$	MS 75
ME 8	31.8 mm	12 mm	- 0.001 %/K	$8 \cdot 10^{-5} \text{ Vs} \cdot \text{cm}$	MS 150, MS 210
ME 9	15.0 mm	5 mm	- 0.001 %/K	$4.9 \cdot 10^{-7} \text{ Vs} \cdot \text{cm}$	MS 20

The stated dipole moments are approximate values. The exact values for each Magnetic Moment Etalon are determined by calibration.

A DAkkS calibration certificate, which documents traceability of calibration to national standards, is included on purchase. Calibration is performed in our ISO/IEC 17025 accredited calibration laboratories. Periodic recalibration is recommended and can of course also be performed by our laboratories.

