

Calibration Laboratory of**Schmid & Partner
Engineering AG**

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Multilateral Agreement for the recognition of calibration certificates**Accreditation No.: **SCS 0108**

Client

AIT

Dongguan

Certificate No.

MAGPy-8H3D-3107**CALIBRATION CERTIFICATE**

Object

MAGPy-8H3D+E3D SN:3107
MAGPy-DAS SN:3097

Calibration procedure(s)

QA CAL-46.v1
Calibration Procedure for MAGPy-8H3D+E3D
Near-field Electric and Magnetic Field Sensor System

Calibration date

March 15, 2024

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Oscilloscope	SN: 112135	25-Sep-23 (No. 17A1162175)	Sep-24
Reference 20 dB Attenuator	SN: CC2552 (20x)	04-Apr-23 (No. 217-03527)	Apr-24
Type-N mismatch	SN: 310982 / 06327	04-Apr-23 (No. 217-03528)	Apr-24

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Network Analyzer E5061B	SN: MY49810822	In house check: Nov-23	In house check: Nov-24
TEM Cell	SN: S6029i	In house check: Nov-23	In house check: Nov-24
Plate Capacitor	SN: 6028i	In house check: Nov-23	In house check: Nov-24
Resonator (160kHz)	SN: 6030i	In house check: Nov-23	In house check: Nov-24

Calibrated by

Name

Aidonia Georgiadou

Function

Laboratory Engineer

Signature

Approved by

Niels Kuster

Quality Manager

Issued: March 15, 2024

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Glossary

MAGPy-8H3D-E3D Magnetic Amplitude and Gradient Probe – Eight H-field Sensors, Single E-field sensor
MAGPy-DAS Magnetic Amplitude and Gradient Data Acquisition System

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1309-2013, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", November 2013

Methods Applied and Interpretation of Parameters

- Calibration has been performed after the adjustment of the device.
- *Linearity*: Calibration of the linearity of the field reading over the specified dynamic range at 161.75 kHz. Influence of offset voltage is included in this measurement.
- *Frequency response*: Calibration of the field reading over the specified frequency range from 3.0 kHz to 10.0 MHz.
- Receiving Pattern: Assessed for H-field polarizations ϑ , and $\phi = 0^\circ \dots 360^\circ$; $\vartheta = 90^\circ$, and $\phi = 0^\circ \dots 360^\circ$; for the XYZ sensors (in TEM-Cell at 4 kHz, 40 kHz, 400 kHz and 4 MHz).
- Receiving Pattern: Assessed for E-field polarizations ϑ , and $\phi = 0^\circ \dots 360^\circ$; $\vartheta = 90^\circ$, and $\phi = 0^\circ \dots 360^\circ$; for the XYZ sensor (in parallel plate capacitor at 4 kHz, 40 kHz, 400 kHz and 4 MHz).

Calibration Uncertainty

The calibration uncertainty is 0.7 dB for the H-field readings and 1.06 dB for the E-field readings. The calibration uncertainty is specified over the frequency range from 3.0 kHz to 10.0 MHz and a dynamic range from 0.1 A/m to 3200 A/m and from 0.08 V/m to 2000 V/m respectively.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

Unit Type	MAGPy-8H3D+E3D (SP MGY 303 AA)	3107
	MAGPy-DAS (SE UMS 303 AC)	3097
	MAGPy FPGA Board	WP000250
Adjustment Date	Last MAGPy Adjustment	March 15, 2024
Firmware SW Version	MAGPy Firmware	Ver. 1.00
Backend SW Version	MAGPy Backend	Ver. 1.0.2
Calibration SW Version	MAGACAP	Ver. 1.0

Dynamic Range

Dynamic Range, H-field, Channel 0

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
x	y	z	x	y	z	x	y	z	
0.400	0.390	0.380	0.420	0.400	0.390	0.42	0.22	0.23	±1.00
0.540	0.530	0.510	0.570	0.550	0.530	0.47	0.32	0.33	±1.00
0.740	0.720	0.700	0.780	0.720	0.720	0.46	0.00	0.24	±1.00
0.970	0.940	0.910	1.01	0.930	0.940	0.35	-0.09	0.28	±1.00
1.31	1.28	1.24	1.33	1.28	1.25	0.13	0.00	0.07	±1.00
1.80	1.76	1.70	1.81	1.77	1.71	0.05	0.05	0.05	±1.00
2.40	2.34	2.26	2.42	2.34	2.28	0.07	0.00	0.08	±0.20
3.20	3.13	3.03	3.23	3.13	3.04	0.08	0.00	0.03	±0.20
4.35	4.25	4.11	4.37	4.26	4.11	0.04	0.02	0.00	±0.20
5.88	5.75	5.56	5.91	5.76	5.56	0.04	0.02	0.00	±0.20
7.92	7.73	7.48	7.94	7.74	7.50	0.02	0.01	0.02	±0.20
10.6	10.3	9.99	10.6	10.3	10.0	0.00	0.00	0.01	±0.20
14.3	13.9	13.5	14.3	14.0	13.5	0.00	0.06	0.00	±0.20
19.3	18.8	18.2	19.3	18.8	18.2	0.00	0.00	0.00	±0.20
26.0	25.4	24.6	26.1	25.4	24.6	0.03	0.00	0.00	±0.20
34.7	33.9	32.8	34.9	34.0	32.9	0.05	0.03	0.03	±0.20
46.9	45.8	44.3	47.1	46.0	44.5	0.04	0.04	0.04	±0.20
63.5	61.9	60.0	63.9	62.3	60.3	0.05	0.06	0.04	±0.20
87.3	85.2	82.5	87.0	84.8	82.1	-0.03	-0.04	-0.04	±0.20
114	111	108	114	111	108	0.00	0.00	0.00	±0.20
157	153	148	156	153	148	-0.06	0.00	0.00	±0.20
218	212	206	217	212	205	-0.04	0.00	-0.04	±0.20
301	294	284	296	288	279	-0.15	-0.18	-0.15	±0.20
444	433	419	438	428	414	-0.12	-0.10	-0.10	±0.20
612	597	578	608	594	574	-0.06	-0.04	-0.06	±0.20
911	889	860	916	893	864	0.05	0.04	0.04	±0.20
1370	1340	1300	1400	1370	1320	0.19	0.19	0.13	±0.30
1890	1840	1790	1950	1900	1840	0.27	0.28	0.24	±0.30
3030	2960	2870	3170	3090	2990	0.39	0.37	0.36	±0.50
3640	3560	3450	3830	3730	3620	0.44	0.41	0.42	±0.50

SPEAG H-field linearity tolerance criteria¹:

- ±1.0dB for applied H-fields < 2.0 A/m
- ±0.2dB for applied H-fields ≥ 2.0 A/m and < 1000 A/m
- ±0.3dB for applied H-fields ≥ 1000 A/m and < 2000 A/m
- ±0.4dB for applied H-fields ≥ 2000 A/m and < 3000 A/m
- ±0.5dB for applied H-fields ≥ 3000 A/m

¹ Calibration uncertainty not taken into account (shared risk 50%).

Dynamic Range, H-field, Channel 1

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
x	y	z	x	y	z	x	y	z	
0.400	0.390	0.380	0.420	0.410	0.400	0.42	0.43	0.45	±1.00
0.550	0.530	0.520	0.570	0.560	0.540	0.31	0.48	0.33	±1.00
0.750	0.730	0.710	0.780	0.750	0.740	0.34	0.23	0.36	±1.00
0.980	0.960	0.930	0.980	0.950	0.960	0.00	-0.09	0.28	±1.00
1.33	1.29	1.26	1.33	1.30	1.28	0.00	0.07	0.14	±1.00
1.83	1.78	1.73	1.83	1.80	1.74	0.00	0.10	0.05	±1.00
2.43	2.37	2.31	2.45	2.38	2.33	0.07	0.04	0.07	±0.20
3.25	3.16	3.08	3.25	3.18	3.11	0.00	0.05	0.08	±0.20
4.41	4.30	4.18	4.42	4.31	4.20	0.02	0.02	0.04	±0.20
5.96	5.82	5.66	5.98	5.82	5.69	0.03	0.00	0.05	±0.20
8.03	7.82	7.61	8.04	7.82	7.63	0.01	0.00	0.02	±0.20
10.7	10.4	10.2	10.7	10.5	10.2	0.00	0.08	0.00	±0.20
14.5	14.1	13.7	14.5	14.1	13.8	0.00	0.00	0.06	±0.20
19.5	19.0	18.5	19.6	19.0	18.6	0.04	0.00	0.05	±0.20
26.4	25.7	25.0	26.4	25.7	25.0	0.00	0.00	0.00	±0.20
35.2	34.3	33.4	35.4	34.4	33.5	0.05	0.03	0.03	±0.20
47.6	46.3	45.1	47.8	46.5	45.3	0.04	0.04	0.04	±0.20
64.3	62.6	61.0	64.8	63.0	61.3	0.07	0.06	0.04	±0.20
88.5	86.2	83.9	88.2	85.8	83.6	-0.03	-0.04	-0.03	±0.20
116	113	110	115	112	109	-0.08	-0.08	-0.08	±0.20
159	155	151	159	154	150	0.00	-0.06	-0.06	±0.20
221	215	209	220	214	209	-0.04	-0.04	0.00	±0.20
305	297	289	300	292	284	-0.14	-0.15	-0.15	±0.20
450	439	427	444	433	421	-0.12	-0.12	-0.12	±0.20
620	604	588	616	601	585	-0.06	-0.04	-0.04	±0.20
923	900	875	929	904	881	0.06	0.04	0.06	±0.20
1390	1360	1320	1420	1390	1350	0.19	0.19	0.20	±0.30
1920	1870	1820	1980	1920	1870	0.27	0.23	0.24	±0.30
3080	3000	2920	3210	3130	3050	0.36	0.37	0.38	±0.50
3690	3600	3510	3880	3780	3690	0.44	0.42	0.43	±0.50

SPEAG H-field linearity tolerance criteria¹:

- ±1.0dB for applied H-fields < 2.0 A/m
- ±0.2dB for applied H-fields ≥ 2.0 A/m and < 1000 A/m
- ±0.3dB for applied H-fields ≥ 1000 A/m and < 2000 A/m
- ±0.4dB for applied H-fields ≥ 2000 A/m and < 3000 A/m
- ±0.5dB for applied H-fields ≥ 3000 A/m

¹ Calibration uncertainty not taken into account (shared risk 50%).

Dynamic Range, H-field, Channel 2

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
x	y	z	x	y	z	x	y	z	
0.400	0.390	0.390	0.410	0.410	0.410	0.21	0.43	0.43	±1.00
0.540	0.540	0.530	0.560	0.560	0.550	0.32	0.32	0.32	±1.00
0.740	0.740	0.730	0.770	0.740	0.750	0.35	0.00	0.23	±1.00
0.960	0.960	0.950	1.00	0.950	0.950	0.35	-0.09	0.00	±1.00
1.30	1.30	1.28	1.31	1.30	1.27	0.07	0.00	-0.07	±1.00
1.79	1.78	1.76	1.81	1.80	1.75	0.10	0.10	-0.05	±1.00
2.39	2.37	2.34	2.41	2.38	2.35	0.07	0.04	0.04	±0.20
3.19	3.17	3.13	3.21	3.19	3.12	0.05	0.05	-0.03	±0.20
4.33	4.31	4.25	4.34	4.32	4.24	0.02	0.02	-0.02	±0.20
5.86	5.83	5.75	5.87	5.85	5.75	0.01	0.03	0.00	±0.20
7.88	7.85	7.73	7.89	7.85	7.72	0.01	0.00	-0.01	±0.20
10.5	10.5	10.3	10.5	10.5	10.3	0.00	0.00	0.00	±0.20
14.2	14.2	13.9	14.2	14.2	13.9	0.00	0.00	0.00	±0.20
19.2	19.1	18.8	19.2	19.1	18.8	0.00	0.00	0.00	±0.20
25.9	25.8	25.4	25.9	25.8	25.4	0.00	0.00	0.00	±0.20
34.6	34.4	33.9	34.7	34.6	34.0	0.03	0.05	0.03	±0.20
46.7	46.5	45.8	46.9	46.7	46.0	0.04	0.04	0.04	±0.20
63.2	62.8	62.0	63.6	63.2	62.3	0.05	0.06	0.04	±0.20
86.9	86.4	85.3	86.6	86.1	84.9	-0.03	-0.03	-0.04	±0.20
114	113	112	113	113	111	-0.08	0.00	-0.08	±0.20
156	155	153	156	155	153	0.00	0.00	0.00	±0.20
217	215	213	216	215	212	-0.04	0.00	-0.04	±0.20
300	298	294	294	293	289	-0.18	-0.15	-0.15	±0.20
442	440	434	436	434	428	-0.12	-0.12	-0.12	±0.20
609	606	598	606	602	593	-0.04	-0.06	-0.07	±0.20
906	902	889	912	907	894	0.06	0.05	0.05	±0.20
1370	1360	1340	1400	1390	1370	0.19	0.19	0.19	±0.30
1880	1870	1850	1940	1930	1900	0.27	0.27	0.23	±0.30
3020	3010	2970	3160	3140	3090	0.39	0.37	0.34	±0.50
3630	3610	3560	3810	3790	3740	0.42	0.42	0.43	±0.50

SPEAG H-field linearity tolerance criteria¹:

- ±1.0dB for applied H-fields < 2.0 A/m
- ±0.2dB for applied H-fields ≥ 2.0 A/m and < 1000 A/m
- ±0.3dB for applied H-fields ≥ 1000 A/m and < 2000 A/m
- ±0.4dB for applied H-fields ≥ 2000 A/m and < 3000 A/m
- ±0.5dB for applied H-fields ≥ 3000 A/m

¹ Calibration uncertainty not taken into account (shared risk 50%).

Dynamic Range, H-field, Channel 3

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
x	y	z	x	y	z	x	y	z	
0.400	0.390	0.380	0.420	0.400	0.390	0.42	0.22	0.23	±1.00
0.540	0.530	0.520	0.570	0.540	0.540	0.47	0.16	0.33	±1.00
0.740	0.730	0.710	0.770	0.740	0.730	0.35	0.12	0.24	±1.00
0.960	0.950	0.930	0.980	0.970	0.950	0.18	0.18	0.18	±1.00
1.30	1.28	1.25	1.31	1.29	1.26	0.07	0.07	0.07	±1.00
1.79	1.76	1.72	1.81	1.75	1.71	0.10	-0.05	-0.05	±1.00
2.38	2.35	2.29	2.40	2.34	2.31	0.07	-0.04	0.08	±0.20
3.18	3.14	3.06	3.19	3.15	3.10	0.03	0.03	0.11	±0.20
4.32	4.27	4.16	4.31	4.27	4.18	-0.02	0.00	0.04	±0.20
5.84	5.77	5.63	5.83	5.78	5.65	-0.01	0.02	0.03	±0.20
7.86	7.77	7.57	7.85	7.75	7.58	-0.01	-0.02	0.01	±0.20
10.5	10.4	10.1	10.5	10.3	10.1	0.00	-0.08	0.00	±0.20
14.2	14.0	13.7	14.2	14.0	13.7	0.00	0.00	0.00	±0.20
19.1	18.9	18.4	19.1	18.9	18.4	0.00	0.00	0.00	±0.20
25.8	25.5	24.9	25.8	25.5	24.9	0.00	0.00	0.00	±0.20
34.5	34.0	33.2	34.6	34.2	33.3	0.03	0.05	0.03	±0.20
46.6	46.0	44.9	46.7	46.1	45.0	0.02	0.02	0.02	±0.20
63.0	62.2	60.7	63.4	62.5	61.0	0.05	0.04	0.04	±0.20
86.7	85.5	83.4	86.4	85.2	83.2	-0.03	-0.03	-0.02	±0.20
113	112	109	113	112	109	0.00	0.00	0.00	±0.20
156	154	150	155	153	150	-0.06	-0.06	0.00	±0.20
216	213	208	215	213	207	-0.04	0.00	-0.04	±0.20
299	295	288	293	290	283	-0.18	-0.15	-0.15	±0.20
441	435	424	436	430	419	-0.10	-0.10	-0.10	±0.20
607	599	585	605	597	582	-0.03	-0.03	-0.04	±0.20
904	893	870	911	898	877	0.07	0.05	0.07	±0.20
1360	1350	1310	1390	1370	1340	0.19	0.13	0.20	±0.30
1880	1850	1810	1940	1910	1860	0.27	0.28	0.24	±0.30
3010	2970	2900	3150	3090	3030	0.39	0.34	0.38	±0.50
3620	3570	3490	3800	3720	3670	0.42	0.36	0.44	±0.50

SPEAG H-field linearity tolerance criteria¹:

- ±1.0dB for applied H-fields < 2.0 A/m
- ±0.2dB for applied H-fields ≥ 2.0 A/m and < 1000 A/m
- ±0.3dB for applied H-fields ≥ 1000 A/m and < 2000 A/m
- ±0.4dB for applied H-fields ≥ 2000 A/m and < 3000 A/m
- ±0.5dB for applied H-fields ≥ 3000 A/m

¹ Calibration uncertainty not taken into account (shared risk 50%).

Dynamic Range, H-field, Channel 4

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
x	y	z	x	y	z	x	y	z	
0.400	0.400	0.390	0.420	0.420	0.400	0.42	0.42	0.22	±1.00
0.540	0.540	0.530	0.560	0.550	0.540	0.32	0.16	0.16	±1.00
0.740	0.740	0.730	0.760	0.740	0.730	0.23	0.00	0.00	±1.00
0.960	0.970	0.950	0.970	0.960	0.950	0.09	-0.09	0.00	±1.00
1.30	1.31	1.28	1.29	1.32	1.29	-0.07	0.07	0.07	±1.00
1.79	1.80	1.76	1.78	1.80	1.76	-0.05	0.00	0.00	±1.00
2.39	2.39	2.34	2.40	2.39	2.35	0.04	0.00	0.04	±0.20
3.19	3.20	3.13	3.18	3.19	3.14	-0.03	-0.03	0.03	±0.20
4.33	4.35	4.26	4.34	4.34	4.28	0.02	-0.02	0.04	±0.20
5.85	5.88	5.76	5.88	5.88	5.79	0.04	0.00	0.05	±0.20
7.88	7.91	7.74	7.89	7.91	7.76	0.01	0.00	0.02	±0.20
10.5	10.6	10.3	10.5	10.6	10.4	0.00	0.00	0.08	±0.20
14.2	14.3	14.0	14.2	14.3	14.0	0.00	0.00	0.00	±0.20
19.2	19.2	18.9	19.2	19.2	18.9	0.00	0.00	0.00	±0.20
25.9	26.0	25.4	25.9	25.9	25.4	0.00	-0.03	0.00	±0.20
34.6	34.7	34.0	34.7	34.8	34.1	0.03	0.02	0.03	±0.20
46.7	46.8	45.9	46.9	47.0	46.0	0.04	0.04	0.02	±0.20
63.1	63.3	62.1	63.6	63.7	62.3	0.07	0.05	0.03	±0.20
86.9	87.2	85.3	86.5	86.8	85.0	-0.04	-0.04	-0.03	±0.20
114	114	112	113	114	111	-0.08	0.00	-0.08	±0.20
156	157	153	156	156	153	0.00	-0.06	0.00	±0.20
216	217	213	216	217	212	0.00	0.00	-0.04	±0.20
299	301	294	294	295	289	-0.15	-0.17	-0.15	±0.20
442	444	434	436	438	428	-0.12	-0.12	-0.12	±0.20
608	611	598	605	609	595	-0.04	-0.03	-0.04	±0.20
906	910	890	912	916	897	0.06	0.06	0.07	±0.20
1370	1370	1340	1390	1400	1370	0.13	0.19	0.19	±0.30
1880	1890	1850	1940	1950	1910	0.27	0.27	0.28	±0.30
3020	3030	2970	3150	3170	3100	0.37	0.39	0.37	±0.50
3620	3640	3570	3810	3830	3750	0.44	0.44	0.43	±0.50

SPEAG H-field linearity tolerance criteria¹:

- ±1.0dB for applied H-fields < 2.0 A/m
- ±0.2dB for applied H-fields ≥ 2.0 A/m and < 1000 A/m
- ±0.3dB for applied H-fields ≥ 1000 A/m and < 2000 A/m
- ±0.4dB for applied H-fields ≥ 2000 A/m and < 3000 A/m
- ±0.5dB for applied H-fields ≥ 3000 A/m

¹ Calibration uncertainty not taken into account (shared risk 50%).

Dynamic Range, H-field, Channel 5

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
x	y	z	x	y	z	x	y	z	
0.400	0.400	0.400	0.410	0.430	0.410	0.21	0.63	0.21	±1.00
0.540	0.550	0.540	0.560	0.560	0.560	0.32	0.16	0.32	±1.00
0.740	0.750	0.740	0.770	0.750	0.760	0.35	0.00	0.23	±1.00
0.970	0.980	0.970	0.980	0.990	0.990	0.09	0.09	0.18	±1.00
1.31	1.32	1.31	1.30	1.35	1.33	-0.07	0.20	0.13	±1.00
1.80	1.82	1.80	1.81	1.82	1.80	0.05	0.00	0.00	±1.00
2.40	2.42	2.40	2.41	2.44	2.40	0.04	0.07	0.00	±0.20
3.21	3.23	3.20	3.22	3.25	3.21	0.03	0.05	0.03	±0.20
4.35	4.39	4.35	4.36	4.40	4.36	0.02	0.02	0.02	±0.20
5.89	5.94	5.88	5.90	5.93	5.94	0.01	-0.01	0.09	±0.20
7.93	7.99	7.91	7.93	7.99	7.99	0.00	0.00	0.09	±0.20
10.6	10.7	10.6	10.6	10.7	10.6	0.00	0.00	0.00	±0.20
14.3	14.4	14.3	14.3	14.4	14.4	0.00	0.00	0.06	±0.20
19.3	19.4	19.3	19.3	19.4	19.3	0.00	0.00	0.00	±0.20
26.1	26.2	26.0	26.0	26.2	26.0	-0.03	0.00	0.00	±0.20
34.8	35.0	34.7	34.9	35.2	34.9	0.02	0.05	0.05	±0.20
47.0	47.3	46.9	47.1	47.5	47.1	0.02	0.04	0.04	±0.20
63.5	64.0	63.4	63.9	64.4	63.8	0.05	0.05	0.05	±0.20
87.4	88.1	87.2	87.1	87.7	86.9	-0.03	-0.04	-0.03	±0.20
114	115	114	114	115	114	0.00	0.00	0.00	±0.20
157	158	157	157	158	156	0.00	0.00	-0.06	±0.20
218	220	217	217	219	217	-0.04	-0.04	0.00	±0.20
301	304	301	296	298	295	-0.15	-0.17	-0.17	±0.20
444	448	444	439	442	438	-0.10	-0.12	-0.12	±0.20
612	617	611	610	613	608	-0.03	-0.06	-0.04	±0.20
911	919	910	918	923	915	0.07	0.04	0.05	±0.20
1380	1390	1370	1410	1410	1400	0.19	0.12	0.19	±0.30
1890	1910	1890	1950	1960	1950	0.27	0.22	0.27	±0.30
3040	3060	3040	3170	3190	3170	0.36	0.36	0.36	±0.50
3650	3680	3650	3830	3850	3830	0.42	0.39	0.42	±0.50

SPEAG H-field linearity tolerance criteria¹:

- ±1.0dB for applied H-fields < 2.0 A/m
- ±0.2dB for applied H-fields ≥ 2.0 A/m and < 1000 A/m
- ±0.3dB for applied H-fields ≥ 1000 A/m and < 2000 A/m
- ±0.4dB for applied H-fields ≥ 2000 A/m and < 3000 A/m
- ±0.5dB for applied H-fields ≥ 3000 A/m

¹ Calibration uncertainty not taken into account (shared risk 50%).

Dynamic Range, H-field, Channel 6

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
x	y	z	x	y	z	x	y	z	
0.410	0.400	0.400	0.420	0.430	0.410	0.21	0.63	0.21	±1.00
0.550	0.540	0.540	0.570	0.590	0.550	0.31	0.77	0.16	±1.00
0.760	0.750	0.740	0.770	0.780	0.760	0.11	0.34	0.23	±1.00
0.980	0.970	0.960	0.990	0.990	0.980	0.09	0.18	0.18	±1.00
1.33	1.32	1.30	1.32	1.34	1.32	-0.07	0.13	0.13	±1.00
1.83	1.81	1.79	1.82	1.84	1.81	-0.05	0.14	0.10	±1.00
2.44	2.41	2.38	2.45	2.42	2.40	0.04	0.04	0.07	±0.20
3.26	3.22	3.18	3.26	3.24	3.19	0.00	0.05	0.03	±0.20
4.42	4.38	4.32	4.42	4.39	4.32	0.00	0.02	0.00	±0.20
5.98	5.92	5.84	5.97	5.92	5.84	-0.01	0.00	0.00	±0.20
8.05	7.97	7.85	8.05	7.96	7.84	0.00	-0.01	-0.01	±0.20
10.8	10.6	10.5	10.8	10.6	10.5	0.00	0.00	0.00	±0.20
14.5	14.4	14.2	14.5	14.3	14.2	0.00	-0.06	0.00	±0.20
19.6	19.4	19.1	19.6	19.4	19.1	0.00	0.00	0.00	±0.20
26.4	26.1	25.8	26.4	26.2	25.8	0.00	0.03	0.00	±0.20
35.3	34.9	34.4	35.4	35.1	34.5	0.02	0.05	0.03	±0.20
47.7	47.2	46.5	47.9	47.3	46.7	0.04	0.02	0.04	±0.20
64.5	63.8	62.9	65.0	64.2	63.2	0.07	0.05	0.04	±0.20
88.8	87.8	86.5	88.5	87.4	86.2	-0.03	-0.04	-0.03	±0.20
116	115	113	116	114	113	0.00	-0.08	0.00	±0.20
160	158	156	159	157	155	-0.05	-0.06	-0.06	±0.20
221	219	216	221	218	215	0.00	-0.04	-0.04	±0.20
306	303	298	301	297	293	-0.14	-0.17	-0.15	±0.20
451	447	440	446	441	434	-0.10	-0.12	-0.12	±0.20
622	615	607	619	612	603	-0.04	-0.04	-0.06	±0.20
926	916	903	932	921	908	0.06	0.05	0.05	±0.20
1400	1380	1360	1430	1410	1390	0.18	0.19	0.19	±0.30
1920	1900	1870	1980	1960	1930	0.27	0.27	0.27	±0.30
3080	3050	3010	3220	3190	3140	0.39	0.39	0.37	±0.50
3700	3660	3620	3890	3850	3800	0.43	0.44	0.42	±0.50

SPEAG H-field linearity tolerance criteria¹:

- ±1.0dB for applied H-fields < 2.0 A/m
- ±0.2dB for applied H-fields ≥ 2.0 A/m and < 1000 A/m
- ±0.3dB for applied H-fields ≥ 1000 A/m and < 2000 A/m
- ±0.4dB for applied H-fields ≥ 2000 A/m and < 3000 A/m
- ±0.5dB for applied H-fields ≥ 3000 A/m

¹ Calibration uncertainty not taken into account (shared risk 50%).

Dynamic Range, H-field, Channel 7

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
x	y	z	x	y	z	x	y	z	
0.400	0.390	0.380	0.440	0.420	0.400	0.83	0.64	0.45	±1.00
0.550	0.530	0.520	0.590	0.550	0.530	0.61	0.32	0.17	±1.00
0.750	0.730	0.710	0.790	0.730	0.730	0.45	0.00	0.24	±1.00
0.980	0.960	0.930	0.990	0.960	0.930	0.09	0.00	0.00	±1.00
1.32	1.29	1.26	1.33	1.31	1.25	0.07	0.13	-0.07	±1.00
1.81	1.78	1.73	1.83	1.78	1.73	0.10	0.00	0.00	±1.00
2.42	2.37	2.30	2.44	2.38	2.32	0.07	0.04	0.08	±0.20
3.23	3.16	3.07	3.23	3.18	3.09	0.00	0.05	0.06	±0.20
4.38	4.30	4.17	4.39	4.32	4.19	0.02	0.04	0.04	±0.20
5.93	5.82	5.64	5.94	5.83	5.67	0.01	0.01	0.05	±0.20
7.98	7.83	7.59	7.97	7.83	7.63	-0.01	0.00	0.05	±0.20
10.7	10.4	10.1	10.7	10.5	10.2	0.00	0.08	0.09	±0.20
14.4	14.1	13.7	14.4	14.1	13.7	0.00	0.00	0.00	±0.20
19.4	19.0	18.5	19.4	19.0	18.5	0.00	0.00	0.00	±0.20
26.2	25.7	24.9	26.2	25.7	25.0	0.00	0.00	0.03	±0.20
35.0	34.3	33.3	35.1	34.4	33.4	0.02	0.03	0.03	±0.20
47.2	46.3	45.0	47.4	46.4	45.1	0.04	0.02	0.02	±0.20
63.9	62.6	60.8	64.3	63.0	61.1	0.05	0.06	0.04	±0.20
88.0	86.2	83.7	87.6	85.9	83.3	-0.04	-0.03	-0.04	±0.20
115	113	109	115	112	109	0.00	-0.08	0.00	±0.20
158	155	150	158	154	150	0.00	-0.06	0.00	±0.20
219	215	209	219	214	208	0.00	-0.04	-0.04	±0.20
303	297	289	298	292	283	-0.14	-0.15	-0.18	±0.20
447	439	425	442	434	420	-0.10	-0.10	-0.10	±0.20
616	604	586	613	602	583	-0.04	-0.03	-0.04	±0.20
917	900	872	924	906	878	0.07	0.06	0.06	±0.20
1380	1360	1320	1410	1390	1340	0.19	0.19	0.13	±0.30
1900	1870	1810	1960	1930	1870	0.27	0.27	0.28	±0.30
3060	3000	2910	3190	3130	3040	0.36	0.37	0.38	±0.50
3670	3600	3500	3860	3790	3680	0.44	0.45	0.44	±0.50

SPEAG H-field linearity tolerance criteria¹:

- ±1.0dB for applied H-fields < 2.0 A/m
- ±0.2dB for applied H-fields ≥ 2.0 A/m and < 1000 A/m
- ±0.3dB for applied H-fields ≥ 1000 A/m and < 2000 A/m
- ±0.4dB for applied H-fields ≥ 2000 A/m and < 3000 A/m
- ±0.5dB for applied H-fields ≥ 3000 A/m

¹ Calibration uncertainty not taken into account (shared risk 50%).

Dynamic Range, E-field, Channel 0

E-field/(V/m) Applied			E-field/(V/m) Reading			Difference/(dB)			Tolerance/(dB)		
x	y	z	x	y	z	x	y	z	x	y	z
0.340	0.210	0.130	0.350	0.210	0.100	0.25	0.00	-2.28	±5.00	±5.00	±5.00
0.460	0.290	0.170	0.470	0.270	0.160	0.19	-0.62	-0.53	±5.00	±5.00	±5.00
0.640	0.390	0.240	0.640	0.400	0.220	0.00	0.22	-0.76	±5.00	±5.00	±5.00
0.830	0.510	0.310	0.830	0.500	0.310	0.00	-0.17	0.00	±5.00	±5.00	±5.00
1.13	0.700	0.420	1.12	0.700	0.430	-0.08	0.00	0.20	±5.00	±5.00	±5.00
1.55	0.960	0.580	1.55	0.960	0.560	0.00	0.00	-0.30	±5.00	±5.00	±5.00
2.06	1.28	0.770	2.08	1.26	0.770	0.08	-0.14	0.00	±1.00	±5.00	±5.00
2.75	1.70	1.02	2.77	1.69	1.02	0.06	-0.05	0.00	±1.00	±5.00	±5.00
3.74	2.32	1.39	3.77	2.31	1.39	0.07	-0.04	0.00	±1.00	±1.00	±5.00
5.06	3.13	1.88	5.09	3.11	1.88	0.05	-0.06	0.00	±1.00	±1.00	±5.00
6.81	4.22	2.53	6.84	4.20	2.50	0.04	-0.04	-0.10	±1.00	±1.00	±1.00
9.09	5.63	3.38	9.12	5.60	3.35	0.03	-0.05	-0.08	±1.00	±1.00	±1.00
12.3	7.60	4.57	12.3	7.56	4.55	0.00	-0.05	-0.04	±1.00	±1.00	±1.00
16.6	10.2	6.16	16.6	10.2	6.08	0.00	0.00	-0.11	±1.00	±1.00	±1.00
22.4	13.8	8.32	22.4	13.8	8.23	0.00	0.00	-0.09	±1.00	±1.00	±1.00
29.9	18.5	11.1	30.1	18.4	11.0	0.06	-0.05	-0.08	±1.00	±1.00	±1.00
40.3	24.9	15.0	40.6	24.9	14.9	0.06	0.00	-0.06	±1.00	±1.00	±1.00
54.5	33.8	20.3	55.0	33.8	20.2	0.08	0.00	-0.04	±1.00	±1.00	±1.00
75.0	46.4	27.9	74.9	46.0	27.5	-0.01	-0.08	-0.13	±1.00	±1.00	±1.00
98.1	60.7	36.5	98.2	60.2	35.9	0.01	-0.07	-0.14	±1.00	±1.00	±1.00
135	83.5	50.2	135	82.8	49.5	0.00	-0.07	-0.12	±1.00	±1.00	±1.00
187	116	69.5	187	115	68.6	0.00	-0.08	-0.11	±1.00	±1.00	±1.00
259	160	96.2	261	160	95.7	0.07	0.00	-0.05	±1.00	±1.00	±1.00
382	236	142	372	226	142	-0.23	-0.38	0.00	±1.00	±1.00	±1.00
526	326	195	517	314	197	-0.15	-0.33	0.09	±1.00	±1.00	±1.00
783	485	291	779	475	297	-0.04	-0.18	0.18	±1.00	±1.00	±1.00
1180	732	439	1190	729	454	0.07	-0.04	0.29	±1.00	±1.00	±1.00
1620	1010	604	1660	1010	631	0.21	0.00	0.38	±1.00	±1.00	±1.00
2610	1620	970	2710	1650	979	0.33	0.16	0.08	±1.00	±1.00	±1.00
3130	1940	1160	3270	1990	1180	0.38	0.22	0.15	±1.00	±1.00	±1.00

SPEAG E-field linearity tolerance criteria¹:

±5.0dB for applied E-field < 2V/m

±1.0dB for applied E-field ≥ 2V/m

¹ Calibration uncertainty not taken into account (shared risk 50%).

Frequency Response

Frequency Response, H-field, Channel 0

f/(Hz)	H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
	x	y	z	x	y	z	x	y	z	
3000	1.47	1.47	1.47	1.47	1.47	1.47	0.00	0.00	0.00	±0.3
3200	1.47	1.47	1.46	1.47	1.48	1.48	0.00	0.06	0.12	±0.3
4000	1.46	1.46	1.46	1.46	1.46	1.46	0.00	0.00	0.00	±0.3
5200	1.45	1.45	1.45	1.45	1.45	1.45	0.00	0.00	0.00	±0.3
6600	1.44	1.44	1.44	1.44	1.44	1.43	0.00	0.00	-0.06	±0.3
8200	1.43	1.43	1.43	1.43	1.43	1.43	0.00	0.00	0.00	±0.3
9000	1.42	1.42	1.42	1.42	1.42	1.42	0.00	0.00	0.00	±0.3
10600	4.29	4.24	4.23	4.26	4.25	4.24	-0.06	0.02	0.02	±0.3
13400	4.29	4.25	4.25	4.30	4.26	4.24	0.02	0.02	-0.02	±0.3
17000	4.29	4.25	4.24	4.29	4.26	4.25	0.00	0.02	0.02	±0.3
21400	4.32	4.28	4.27	4.33	4.29	4.26	0.02	0.02	-0.02	±0.3
27200	4.32	4.27	4.26	4.33	4.28	4.26	0.02	0.02	0.00	±0.3
34400	4.32	4.29	4.28	4.33	4.29	4.28	0.02	0.00	0.00	±0.3
40000	4.31	4.28	4.27	4.31	4.27	4.29	0.00	-0.02	0.04	±0.3
43600	4.30	4.28	4.27	4.31	4.28	4.27	0.02	0.00	0.00	±0.3
55400	4.29	4.26	4.26	4.30	4.27	4.25	0.02	0.02	-0.02	±0.3
70000	4.28	4.25	4.25	4.28	4.25	4.25	0.00	0.00	0.00	±0.3
88800	4.27	4.24	4.23	4.27	4.24	4.23	0.00	0.00	0.00	±0.3
112400	4.25	4.23	4.22	4.26	4.23	4.22	0.02	0.00	0.00	±0.3
142400	4.24	4.21	4.20	4.24	4.21	4.20	0.00	0.00	0.00	±0.3
161750	4.22	4.19	4.19	4.22	4.19	4.19	0.00	0.00	0.00	±0.3
180400	4.21	4.18	4.17	4.20	4.18	4.18	-0.02	0.00	0.02	±0.3
228400	4.18	4.15	4.14	4.17	4.15	4.15	-0.02	0.00	0.02	±0.3
289400	4.14	4.11	4.11	4.14	4.12	4.11	0.00	0.02	0.00	±0.3
366400	4.10	4.07	4.07	4.09	4.07	4.07	-0.02	0.00	0.00	±0.3
400000	4.08	4.05	4.05	4.07	4.05	4.05	-0.02	0.00	0.00	±0.3
464000	4.05	4.03	4.02	4.04	4.03	4.02	-0.02	0.00	0.00	±0.3
587800	4.00	3.98	3.98	4.00	3.98	3.98	0.00	0.00	0.00	±0.3
744200	3.95	3.94	3.93	3.95	3.93	3.93	0.00	-0.02	0.00	±0.3
942600	3.94	3.92	3.92	3.94	3.92	3.92	0.00	0.00	0.00	±0.3
1193600	3.91	3.90	3.90	3.92	3.90	3.89	0.02	0.00	-0.02	±0.3
1511600	3.91	3.89	3.89	3.91	3.89	3.89	0.00	0.00	0.00	±0.3
1914400	3.89	3.87	3.87	3.89	3.87	3.87	0.00	0.00	0.00	±0.3
2424400	3.87	3.86	3.85	3.87	3.86	3.85	0.00	0.00	0.00	±0.3
3070200	3.84	3.83	3.82	3.84	3.83	3.82	0.00	0.00	0.00	±0.3
3888000	3.79	3.77	3.76	3.79	3.77	3.77	0.00	0.00	0.02	±0.3
4000000	3.78	3.76	3.76	3.78	3.76	3.76	0.00	0.00	0.00	±0.3
4923800	3.71	3.70	3.70	3.72	3.70	3.69	0.02	0.00	-0.02	±0.3
6235400	3.61	3.59	3.59	3.60	3.59	3.59	-0.02	0.00	0.00	±0.3
7896400	3.47	3.45	3.45	3.46	3.46	3.45	-0.03	0.03	0.00	±0.3
10000000	3.33	3.32	3.32	3.33	3.32	3.31	0.00	0.00	-0.03	±0.3

SPEAG H-field frequency response tolerance criteria¹:

±0.3dB for applied H-fields at calibration points from 3kHz to 10MHz

¹ Calibration uncertainty not taken into account (shared risk 50%).

Frequency Response, H-field, Channel 1

f/(Hz)	H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			Tolerance/(dB)
	x	y	z	x	y	z	x	y	z	
3000	1.47	1.47	1.47	1.48	1.47	1.47	0.06	0.00	0.00	±0.3
3200	1.47	1.47	1.46	1.48	1.47	1.48	0.06	0.00	0.12	±0.3
4000	1.46	1.46	1.46	1.47	1.46	1.45	0.06	0.00	-0.06	±0.3
5200	1.45	1.45	1.45	1.45	1.45	1.44	0.00	0.00	-0.06	±0.3
6600	1.44	1.44	1.44	1.44	1.44	1.43	0.00	0.00	-0.06	±0.3
8200	1.43	1.43	1.43	1.43	1.43	1.43	0.00	0.00	0.00	±0.3
9000	1.42	1.42	1.42	1.42	1.42	1.42	0.00	0.00	0.00	±0.3
10600	4.29	4.24	4.23	4.30	4.25	4.22	0.02	0.02	-0.02	±0.3
13400	4.29	4.25	4.25	4.32	4.25	4.26	0.06	0.00	0.02	±0.3
17000	4.29	4.25	4.24	4.32	4.26	4.26	0.06	0.02	0.04	±0.3
21400	4.32	4.28	4.27	4.33	4.29	4.28	0.02	0.02	0.02	±0.3
27200	4.32	4.27	4.26	4.32	4.29	4.27	0.00	0.04	0.02	±0.3
34400	4.32	4.29	4.28	4.33	4.29	4.29	0.02	0.00	0.02	±0.3
40000	4.31	4.28	4.27	4.33	4.30	4.28	0.04	0.04	0.02	±0.3
43600	4.30	4.28	4.27	4.32	4.28	4.28	0.04	0.00	0.02	±0.3
55400	4.29	4.26	4.26	4.30	4.27	4.26	0.02	0.02	0.00	±0.3
70000	4.28	4.25	4.25	4.29	4.28	4.25	0.02	0.06	0.00	±0.3
88800	4.27	4.24	4.23	4.28	4.25	4.23	0.02	0.02	0.00	±0.3
112400	4.25	4.23	4.22	4.26	4.23	4.22	0.02	0.00	0.00	±0.3
142400	4.24	4.21	4.20	4.24	4.21	4.20	0.00	0.00	0.00	±0.3
161750	4.22	4.19	4.19	4.23	4.19	4.19	0.02	0.00	0.00	±0.3
180400	4.21	4.18	4.17	4.20	4.18	4.18	-0.02	0.00	0.02	±0.3
228400	4.18	4.15	4.14	4.18	4.15	4.14	0.00	0.00	0.00	±0.3
289400	4.14	4.11	4.11	4.14	4.08	4.11	0.00	-0.06	0.00	±0.3
366400	4.10	4.07	4.07	4.10	4.07	4.07	0.00	0.00	0.00	±0.3
400000	4.08	4.05	4.05	4.07	4.05	4.05	-0.02	0.00	0.00	±0.3
464000	4.05	4.03	4.02	4.04	4.03	4.03	-0.02	0.00	0.02	±0.3
587800	4.00	3.98	3.98	4.00	3.98	3.98	0.00	0.00	0.00	±0.3
744200	3.95	3.94	3.93	3.95	3.94	3.93	0.00	0.00	0.00	±0.3
942600	3.94	3.92	3.92	3.94	3.92	3.92	0.00	0.00	0.00	±0.3
1193600	3.91	3.90	3.90	3.91	3.90	3.90	0.00	0.00	0.00	±0.3
1511600	3.91	3.89	3.89	3.90	3.89	3.89	-0.02	0.00	0.00	±0.3
1914400	3.89	3.87	3.87	3.89	3.87	3.86	0.00	0.00	-0.02	±0.3
2424400	3.87	3.86	3.85	3.87	3.85	3.85	0.00	-0.02	0.00	±0.3
3070200	3.84	3.83	3.82	3.84	3.83	3.82	0.00	0.00	0.00	±0.3
3888000	3.79	3.77	3.76	3.79	3.77	3.77	0.00	0.00	0.02	±0.3
4000000	3.78	3.76	3.76	3.78	3.76	3.76	0.00	0.00	0.00	±0.3
4923800	3.71	3.70	3.70	3.71	3.71	3.69	0.00	0.02	-0.02	±0.3
6235400	3.61	3.59	3.59	3.61	3.60	3.60	0.00	0.02	0.02	±0.3
7896400	3.47	3.45	3.45	3.47	3.45	3.45	0.00	0.00	0.00	±0.3
10000000	3.33	3.32	3.32	3.32	3.32	3.32	-0.03	0.00	0.00	±0.3

SPEAG H-field frequency response tolerance criteria¹:
±0.3dB for applied H-fields at calibration points from 3kHz to 10MHz

¹ Calibration uncertainty not taken into account (shared risk 50%).