

Electromagnetic exposure safety of the Articulograph AG500/AG200

The magnetic field measurements were performed using a measuring instrument from Wandel & Goldermann, Typ EEFA 300, along with a probe with a cross-sectional plane of 3x100 mm² (size of coils). The deviation is ± 5 %.

The references refer to the permissible values (exposure of less than eight hours) in the range of 5 to 32 kHz mentioned in

International Commission on Non-Ionising Radiation Protection (ICNRP). Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz). Health Physics 74: 494-522 (1998).

The strength of the magnetic field in the center of the measuring range amounts to 1.25µT. This value will correspond to only 5 % of the permissible permanent safe exposure in the operating range.

During an investigation, the head of the patient will be for the most part in the center of the measuring range. Nevertheless, additionally, the probe was placed next to each of the transmitter coils. The measured values, as well as the value of the center of magnetic field, are summarized in the following table.

position	frequency [Hz]	amplitude [digits]	field strength [µT]	percentage of threshold value [%]
center	---	---	1,25	5
KU_S1	12500	24139	11,1	36
KO_S4	11250	23022	13,1	45
SR_S5	8750	23966	11,66	30
SL_S3	13750	24370	8,85	36
NR_S6	10000	23029	16,66	60
NL_S2	7500	23236	13,3	36

The greatest value measured was that near transmitter coil NR_S6. This value corresponds to **60 %** of permissible permanent safe exposure in the **operating range for 8 hours**.

In case of exposure **maximum of two hours**, the permissible threshold value is reduced. In consequence, the respective value near transmitter coil NR_S6 decreases to **only 11 %** of permissible permanent safe exposure in the operating range.

The Magnetfield Strength for the AG200 system

The field strength for the Articulograph AG200 is calculated by comparing the measured signals by the Articulograph AG200, the geometrical relations and the adjusted transmitter strength.

The lower frequencies (7500Hz – 10000Hz) are not used by the Articulograph AG200 system.

For different sensors, a different transmitter strength has to be adjusted. The SM220 sensors need a higher magnetic field.

By use of HS220-sensors

position	frequency [Hz]	amplitude [digits]	field strength [μ T]	percentage of threshold value [%]
center			1,25	5
Forehead (green) KU_S1	12500	3500	5,55	18
Chin (blue) KO_S4	11250	3900	6,55	22,5
neck (red) SL_S3	13750	3100	5,83	18

By use of SM220-sensors

position	frequency [Hz]	amplitude [digits]	field strength [μ T]	percentage of threshold value [%]
center			1,5	6
Forehead (green) KU_S1	12500	4400	6,66	21,6
Chin (blue) KO_S4	11250	4900	7,86	27
neck (red) SL_S3	13750	4000	5,31	21,6