



# Baby monitors

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Baby monitoring systems comprise a baby unit and one or more parent units. The baby unit, installed in the infant's room, is a transmitter (producing emissions), and parent units are mainly receivers. In some cases, however, both units are capable of transmitting and receiving. Most baby monitors do not transmit signals (produce emissions) continuously, but only when a certain sound level – set by the user – is reached in the nursery (e.g. voice activation).



Some systems also monitor whether the parent unit is still within range of the baby unit, by transmitting brief test signals (i.e. emissions) every few seconds.

A wide variety of baby monitors are available, with widely varying ranges and emission levels. Emissions from two systems with different transmitting powers were measured on behalf of the FOPH. They were found to decline very rapidly as the distance from the device increases, and to lie consistently below the recommended limit. At a distance of 20 cm, emissions from the less powerful device are 28 times lower and from the more powerful device 3 times lower than the recommended limit. At a distance of 1 metre, emissions are, respectively, 93 and 9 times lower than the recommended limit. Even if the device accidentally comes into contact with the infant during operation, the values for the systems tested are below the recommended limit. The emissions produced when a range-checking test signal is transmitted are much lower still.

On the basis of the available findings, emissions from systems of this kind are not expected to pose any hazard. It is, however, **advisable to reduce the infant's exposure to emissions as far as possible.**

- Place the baby monitor at least a metre away from the cot.
- Do not use systems that transmit continuously. Set the baby unit to voice activation mode.
- If the baby monitor is mains operated, ensure that the adaptor is plugged in at least 50 cm away from the cot.



# 1 Technical data

Baby monitors operate at a wide variety of frequencies, with corresponding differences in transmitting power and range (Table 1). For most of these frequencies, devices are not permitted to transmit continuously (continuous carrier); signals should therefore only be transmitted from a given sound level. Most monitoring systems are unidirectional, i.e. the baby unit can only transmit and the parent unit can only receive. In systems with a range-checking function, a signal is transmitted by the baby unit every few seconds to determine whether the parent unit is still within range. In some cases, this function can be deactivated. With bidirectional systems, where both units can transmit and receive, range checking can be performed using the parent unit, e.g. by pressing a button. Certain systems also have a video monitoring function. These require a continuous carrier (e.g. at 2400 MHz) and produce emissions continuously.

The limits recommended by the International Commission on Non-Ionizing Radiation Protection (IC-NIRP) for electric fields depend on the frequency [1].

**Table 1: Frequencies used by baby monitors**

Frequency (MHz)	Wavelength (m)	Max. transmitting power (mW)	Max. range (m)	OFCOM designation	ICNIRP Reference level (V/m)
27	11	100	400	Wireless audio Baby monitoring	28
40,7	6,5	10	150	Gen. short-range radio devices	28
446	0,7	500	5000	Professional mo- bile radio	29
865	0,35	10	400	Wireless audio	40
1800	0,17	20		Wireless audio	58
1900	0,16	250	300	DECT	60
2400	0,125	10	300	Gen. short-range radio devices	61

## Low-frequency fields

Baby monitors are battery or mains operated. In mains-operated systems, the adaptor is in operation even when the device is switched off. Frequently, a low-cost, inefficient transformer is used, producing substantial 50 Hz (stray) magnetic fields in the immediate environment. At a distance of 50 cm, however, these stray fields are very weak.



## 2 Exposure measurements

Exposure to emissions is best described by the specific absorption rate (SAR, in watts per kilogram), which is a measurement of the electromagnetic radiation (W) absorbed by the human body (kg). In appliances operated at least one wavelength away from the body, the electric field can be measured as a basis for calculation of the SAR.

In a study carried out by the IT`IS Foundation on behalf of the FOPH, electric fields were measured for two different baby monitors. Although baby monitors should not be operated close to the body, the SAR was also determined for both models [2]. For these measurements, a sustained tone was used to keep the devices operating continuously, producing the highest possible emission levels.

### SAR values

The SAR values measured for the two baby monitors are shown in Table 2. In both cases, the value is well below the limit of 2 W/kg recommended by the ICNIRP [1].

**Table 2: SAR values for two markedly differing baby monitors**

Device	Frequency (MHz)	Transmitting power (mW)	SAR (W/kg)
Baby monitor 1	863	10	0,01
Baby monitor 2	446	500	0,08

### Electric fields

The electric fields measured close to the devices during continuous operation are shown in Figure 1. It is striking that these are highly distance dependent. The field strengths measured are always below the frequency-dependent limits recommended by the ICNIRP (40 V/m for baby monitor 1 and 29 V/m for baby monitor 2) [1]. At the recommended operating distance of a metre, the fields are 0.43 V/m and 3.2 V/m respectively.

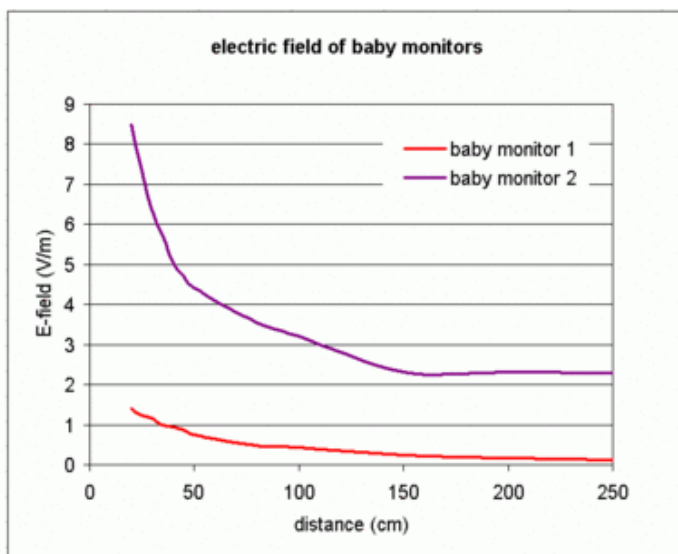


Figure 1: Electric field (E-field) over distance for two different baby monitors [2].



### 3 Health effects

Short-term health effects due to electromagnetic fields can be assessed on the basis of the limits recommended by the ICNIRP [1]. Since emissions from baby monitors are well below these limits, short-term health effects are not to be expected.

Little is known about possible long-term effects of weak high-frequency electromagnetic fields, such as occur in the vicinity of baby monitors. One way of responding to these uncertainties is, as a precautionary measure, to minimize exposure by ensuring that the recommended distance between the device and the infant is maintained, and by switching on the voice activation function.

### 4 Legal regulations

Specifications for the output power of baby monitors are included in the technical interface regulations (RIR) issued by the Federal Office of Communications (OFCOM).

⇒ [BAKOM: Technical Radio Interface Regulations](#)



## 5 Literature

1. ICNIRP. Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields up to 300 GHz. Health Phys. 75: 494-521. 1998.
2. Kramer A et al. Development of Procedures for the Assessment of Human Exposure to EMF from Wireless Devices in Home and Office Environments. 2005. Rapport IT'IS.

**Specialist staff:**

Federal Office of Public Health FOPH  
emf@bag.admin.ch