

SAR Meter ESM-120

maschek.

Realtime SAR
measurements



► What is SAR?

In today's industrial society the use of wireless devices which emit electromagnetic fields is becoming more and more frequent. National and international norms set limiting values which, for health reasons should not be exceeded.

The specific absorption rate SAR corresponds to the energy absorbed by the body in an electromagnetic field. This is used as a base quantity to evaluate this high frequency electromagnetic exposure and indicates the power absorbed into the tissue per unit of mass.

This leads to a warming of the tissue and in the case of the relevant values, to tissue damage. The most sensitive body parts besides the brain are the eyes.

The unit is watt/kg of tissue. In the case of close field exposure as, for example when using mobile telephones, the SAR limiting values refer to the maximum average absorption that occurs in the human body and per 1g or 10g of tissue mass.

Basisgrenzwerte der SAR		
Mittelungsmasse:	ANSI C95.1-199	DIN VDE 0848, ICNIRP
Ganzkörper:	0,08W/kg	0,08W/kg
10g:	-	2W/kg
1g:	1,6W/kg	-

► Determination of SAR

So far it was only possible to determine the SAR with the help of complicated measuring systems in which a robot positions a probe and a computer calculates the SAR from the measured values. This procedure is time consuming and expensive and can only be done when the transmitting power is constant.

The amount of time needed to take the measurement of one single mobile phone position is at least 30 minutes. Often more than one measurement is necessary to discover the most unfavorable position with the highest SAR.

► Application fields

The ESM-120 enables a quick and sure determination of the SAR generated by mobile wireless equipment, antennae, stationary radio plants, base stations, etc. It is particularly suitable for research, development and training purposes. Legal questions regarding complaints about mobile cellular phone services can be verified and demonstrated so that the average person can understand them.

As with regards to mobile phone production, now each individual device's actual SAR can be checked. It is also easy to test older devices for faults. Problems in critical surroundings such as, for example in a train, in an airplane, in a tunnel or in a car can now be very easily measured.

Due to the screening effect in such places, the transmitting power is increased to keep up the radio link.

On the other hand high power induces the formation of hot spots caused by reflections which under certain circumstances leads to the exceeding of limits.

Another application field is informing mobile phone users on how to make "low radiation" calls or how to reduce SAR with simple measures, like for example holding a mobile phone in the correct way.

At the same time this can also increase the range. In particular cases, far away from civilization, this minimization of the transmission loss and therefore the increase in the range could enable a call for life-saving help to be made.

► The measuring meter

The ESM-120 is a unique measuring head which enables you to determine the SAR. A new technology (protective rights registered in many countries) has made it possible for the first time, to determine the SAR in real-time. It consists of the actual measuring head with a HF sensor, the body with operating controls, LC display with illumination and an optical interface. The display indicates the current SAR as a decimal value and as a bargraph.

Special features

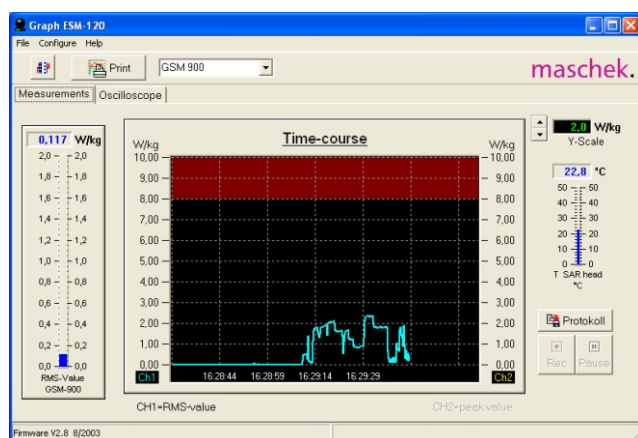
- SAR-measurement in real-time
- Isotropic precision probe
- Frequency range TETRA, GSM900/1800 and UMTS
- Large measuring range 0,001W/kg to 20W/kg
- Automatic frequency selection
- Operation independent of mains or computer
- Automatic measuring range selection
- Signal tone dependent on field intensity
- Tone generator for mobile phone testing
- Very simple and intuitive operation
- Special features to facilitate work
- Clear and well laid out display
- 60 hours of continuous operation

The measurement is carried out according to ANSI C95.1-199 average per 1g of tissue mass. While measuring a mobile phone a tone generator can be selected. This enables the results of the changing SAR to be made visible. As an alternative the SAR can be emitted as a tone that changes its frequency. The instrument is calibrated and equipped with the latest computer technology.



► The software

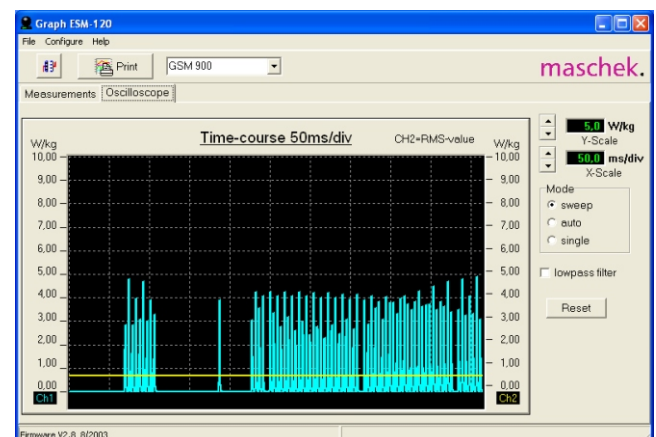
The Windows™ compatible software delivered with the meter allows you to observe the SAR and the power control behavior between the base station and the mobile phone on the scope. It also is used to make the measured values accessible to a larger public, to store them and export them in standard formats.



With the fibre optic cable delivered along with the meter, the ESM-120 can be operated free of interferences and independent of the mains. It is also possible for it to be integrated in automatic test benches.

Special features

- Scope function of SAR values
- Oszilloscope function of SAR values
- Automatic lettering of diagrams
- Online display of measured values as bargraph
- Insertion of limiting values in the graphic
- Remote control of ESM-120
- Export of graphics and tables



► Technical Data

Measuring range:	0,001W/kg - 20W/kg (average per 1g body mass)
Measuring range select:	Automatic (auto-range)
Resolution:	1mW/kg
Bargraph display:	0 - 0,2W/kg 0 - 2W/kg 0 - 20W/kg
Frequency range:	425MHz (TETRA), 900MHz (GSM900), 1750MHz (GSM1800), DECT, 1950MHz (UMTS)
Frequency selection:	automatic for GSM-900, GSM-1800 and UMTS, or manual
Precision:	±3dB
Measuring rate:	2kHz, decimal display 2Hz
Operation:	HF sensor, isotropic, RMS-value, Peak-value
Display:	LC-Display with background illumination
Functions:	Signal tone for mobile phone testing Signal tone dependent on reading 1Hz - 3kHz Display background illumination Change-over between PEAK and RMS value Switch over of bargraph scaling 0,2W/kg, 2W/kg, 20W/kg Low battery display
Battery operation:	Ni-MH 7.2 V 1500mAh, heavy metal free, 3h charging time
Operating time:	Up to 60h without illumination Up to 20h with illumination
PC Interface:	Fibre optic cable - USB Electric power supply via PC or Notebook
Remote control:	All essential functions via fibre optic cable
Operating temperature:	10 to 35°C
Storage temperature:	-10 to 40°C
Dimensions:	approx. 220mm x 200mm x 290mm
Weight	approx. 4,8kg, with case approx. 9,3kg

All technical data at 20°C. The indicated precision reflects the maximum deviation from the theoretically calculated simulation results at the respective average frequencies (cited under frequency range).

► Delivery scope

- SAR-meter
- Software Graph ESM-120
- Fibre optic cable
- USB converter
- Operating instructions
- Calibration certificate
- Battery charger
- Aluminium case

► Manufacturer

Maschek Elektronik
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