

ESM-100 3D Fieldmeter

Patented Measuring of Electric- and
Magnetic Field with FFT



Personal Protection

Electric current plays an important role in practically all areas of life. Nevertheless, tension and current generate electric and magnetic fields which for their part can lead to negative effects on health.

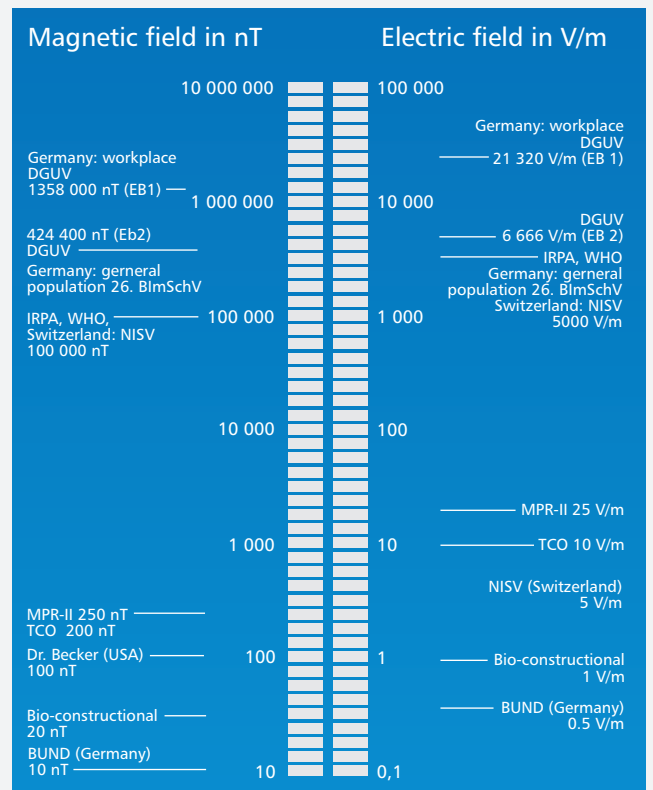
Legislators have reacted to this with various standards and regulations, such as Directive 2013/35/EU, DIN VDE 0848, DGUV, BGV B11, 26. BImSchV, ICNIRP, EN50366 etc. and by so doing underline the relevance that electric and magnetic fields have for our health.

In order to gather data on these effects, measuring instruments are essential. As a result, the following considerations led to the development of the ESM-100 field strength measuring instrument:

To determine a person's real exposure it is necessary to measure the electric and magnetic fields simultaneously and in three dimensions, since both of them cause a flow of current in the body at the same time. Even in technical systems, both components may cause interference.

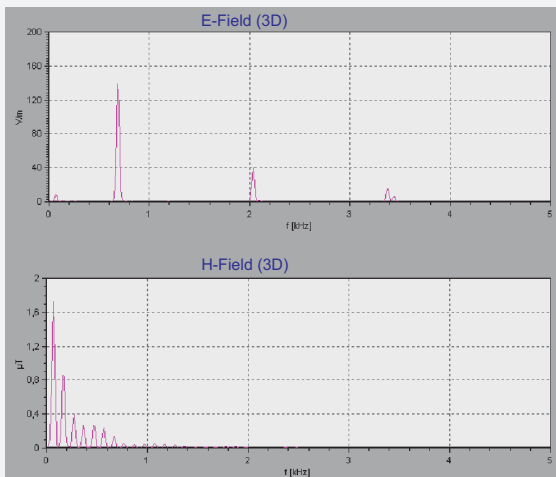
Measuring coils should be small in size in order to deliver sufficiently precise measurement results even at close range to a source of magnetic fields and in order to detect unhomogeneous fields.

Since fields may fluctuate and many maximum permitted values depend on the duration of a person's stay in their vicinity, a continuous 24-hour record by means of a datalogger without the need for a laptop is important.



Limit values of various Institutes at 50 Hz

Electro-automation



The 6-channel FFT version of the ESM-100 displays the spectrum of the 3-D electric and magnetic field of a LCD monitor

The measuring instrument

The ESM-100 3D H/E Field Meter is a unique, patented, hand-held measuring instrument which allows easy measuring of alternating electric and magnetic fields at the same time, independent of direction and corresponding to one common point.

With this device anyone is able to make professional, error-free measurements right from the start.

Modern-day, high-performance electronics is revolutionising nearly all areas of modern electrotechnology. It enables higher processing speeds, more efficient use of energy and completely new applications.

On the other hand, with increasing current strength and switching speeds, interference with sensitive control mechanisms increases dramatically.

In order to be able to trace these reliably and rapidly, electric and magnetic field measuring instruments are very helpful. In this case, too, the simultaneous measurement of electric and magnetic fields plays an important part, since both components alter unpredictably and independently of each other and their effects when added together can cause interference.

By means of the FFT option, the success of measures to suppress interference, such as using filters, shielding or modifying cable runs are immediately visible.

Using the small sensor, sources of interference can be measured precisely from close up without values being distorted due to averaging. In comparison with devices which measure magnetic and electric fields separately, measuring time is halved. Even if today, for instance, only the magnetic field seems to be of interest, the electric field is automatically measured along with it and is available tomorrow at the press of a button, retroactively for all the measurements stored.

Special features

- Simultaneous isotropic measurement of E and H fields
- Frequency range from 5Hz – 400kHz
- Measuring range 1nT – 20mT and 0.1V/m - 100kV/m
- 6 channel FFT and oscilloscope function
- Simple and intuitive operation to avoid measurement errors
- Possibility of handheld E-Field measurements
- High precision $\pm 5\%$ and high long time stability
- Standardized measurements according to: ICNIRP, Directive 2013/35/EU etc.
- Long Term Recording over 24 h, independent of mains and computer
- 28h to 75h Operating time
- Tripod connection for use as active measuring head
- Long Term Memory capacity for 65520 readings in the meter
- Four selectable filters
- Possibility of switching over to 1D measurement
- Programmable signal tone
- Well laid out display with illumination
- up to 45 hours of continuous operation
- Splash-proof and dust-proof according to IP65
- Developed and made in Germany



▶ The software

has been specially developed for the ESM-100 measuring instrument and fulfills the needs and particularities of EMC measurements. It can be used error-free, easily and intuitively.

By means of tabs, you can follow the readings as on the instrument display or display them graphically in real time on the chart recorder.

A multiplicity of functions makes the job easier. The optional FFT function can carry out a Fast Fourier Transformation (FFT) for all six measuring axes at the same time or display the measuring signals as oscillograms. Scaling and labelling of the axes is done automatically. All measurements can be displayed, saved and exported.

The optional cartographie module makes easy work of creating three-dimensional field strength diagrams.

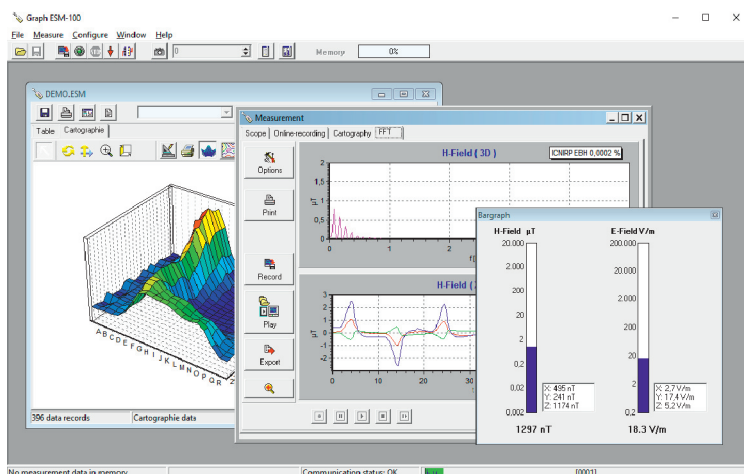
With the aid of the optional GPS Logger, the readings can be displayed in Google Earth™.

Special functions such as displaying frequency-dependent limit values or load-dependent power factor correction for magnetic field measurements facilitate taking measurements as specified by Norms and Standards.

The software is ideally suited to the prescribed documentation on measurements, as well as to remote control of the ESM-100 via its fibre optic cable.

Advantages of the software

- Fast Fourier analysis of the six measuring axes
- Oscilloscope presentation of six measuring axes
- Display of frequency-dependent limiting values
- Display of readings in Google Earth™ by GPS
- Optional mapping of readings
- Real-time, graphic display of readings
- Display of readings in table form
- Text box for each reading
- Readout of ESM-100 memory
- Chart recorder with event triggering
- Magnetic field power factor correction
- Remote control of the ESM-100
- Export of graphs and tables
- Easy and intuitive to operate



► Technical Data

Range:	1 nT - 20mT	0.1V/m - 100kV/m	(>100kHz up to 20μT and 2kV/m)			
Display range:	0nT - 20mT	0.0V/m - 100kV/m	(Filter '50' or '16,7')			
	10nT - 20mT	1.0V/m - 100kV/m	(Filter 'high' or 'low')			
	15nT - 20mT	1.5V/m - 100kV/m	(Filter 'all')			
	1 nT	100mV/m				
Resolution:	Automatic (auto-range)					
Range selection:	5Hz - 400kHz (-3dB Limit)					
Frequency range:	Filter 'all'	5Hz - 400kHz				
	Filter 'high'	2kHz - 400kHz	Filter 'low'	5Hz - 2kHz		
	Filter '50'	50Hz band-pass 12dB	Filter '16'	16.7Hz band-pass 12dB		
	6 channel electric and magnetic field FFT (Hx, Hy, Hz, Ex, Ey, Ez), up to 64ks quasi simultaneous					
FFT function:	FFT Samplerate:	2ks	8ks	16ks	64ks	400ks 800ks
	-3dB analog bandwidth:	1kHz	4kHz	8kHz	25kHz	200kHz 400kHz
	FFT Resolution:	256, 512, 1024 or 2048 points				
	FFT Intervals:	1s up to 512 points, 2s at 1024 points, 2s or 5s at 2048 points FFT's				
	FFT Softwaredisplay:	3D-values or single axis				
	6 channel electric and magnetic field oszilloscop (Hx, Hy, Hz, Ex, Ey, Ez), 5Hz to 100kHz					
Oszilloskop function	±5% (sine, 50nT - 20mT, 5V/m - 100kV/m), ±5 Digits (RMS values)					
Accuracy:	Decimal display 2Hz, Bargraph 10 Hz with 3 sec Peak hold					
Measuring rate:	H-field: coils, isotropic E-field: field plates, isotropic					
Operation:	Continuous true RMS measurement of all 6 axis					
Display:	Liquid crystal display with illumination					
Functions:	H and E fields displayed simultaneously in 3 dimensional values					
	Minimum and maximum value memory, one dimensional measurement (1D) of Hx and Ex					
Long time recording:	Charge control and Battery-fail display					
	RMS values: 65520 samples (6 channels RMS, time and set functions), 1800 without FFT option					
Time interval:	FFT values: 675 - 5040 sample (6 FFT's, 6 RMS values, time and set functions)					
Analogue outputs:	1s, 2s, 5s, 10s, 30s and snapshot					
Battery operation:	4 x 0-600 mV _{rms} (input impedance > 100kOhm) Hx, Ex (instead of Hy / Hz also Ey / Ez)					
Operation time:	Nickel-metal-hydrid batteries (Ni-MH 6V/2700mAh), heavy metal free					
Mains operation:	ca 28h with and 45h without FFT, 75h without FFT option, backlight disabled, fast charge in 4 hours					
PC connections:	Automatic switching between mains operation, fast charge- and maintenance charge mode					
Remote operation:	Fibre optic cable with USB connector					
Temperature range:	All essential functions via fibre optic cable with Graph ESM-100					
Dimensions:	-20 to +50 °C operating temperature					
Weight:	365mm x 83mm x 56mm					
	570g					

All accuracy data refers to RMS values of single axis in the homogenous field. All technical details at 20°C.

► Products

- Field Meter ESM-100: measuring instrument with sensor, Windows™ software Graph ESM-100, USB-fibre optic cable 5m, charger, carrying case, manual, calibration certificate
- FFT Option ESM-100: 6-channel Spectrumanalyser 5Hz - 400kHz and 5Hz - 100kHz oscilloscope function
- GPS Logger ESM-100: GPS-supported display of readings in Google Earth™
- Cartographie Module ESM-100: Windows™ additional software module for ESM-100 graphs
- Adaptor Cable ESM-100: connecting cable with 4 analogue outputs via BNC plugs, 2m
- Tripod ESM-100: special stand made of wood and plastic, up to measuring height of 1.8m, bag

► Sales

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