Low cost EMF Spectrum Analyzer
Series SPECTRAN® 10xx

Cost-effective, easy-to-use LF measurement unit for the novice

Product of the year 2009

Our 3D magnetic-field measurement coil with homogeneous centre won the first price of Europe’s biggest electronic newspaper “Elektronik” at the category passive components. This coil is installed in each NF-Spectran unit.
## Specifications

### SPECTRAN® NF-1010 (10Hz to 2kHz)

- Frequency range: 10Hz to 2kHz*
- Typ. level range E-Field: 1V/m to 2.000 V/m*
- Typ. level range H-Field: 10nT to 100.000nT*
- Typ. precision: 5% *
- Easy to use
- Superfast FFT spectrum analysis
- High-performance DSP (Digital Signal Processor)
- 3D magnetic field measurement
- Frequency and signal strength display!
- High-resolution multi-function display
- Incl. battery, charger & aluminum transportcase
- Dimensions (L/W/D): (260x86x23) mm
- Weight: 420gr
- **Warranty: 10 years**

### SPECTRAN® NF-1010E (10Hz to 10kHz)

- Frequency range: 10Hz to 10kHz*
- Typ. level range E-Field: 1V/m to 2.000 V/m*
- Typ. level range H-Field: 10nT to 100.000nT*
- Typ. precision: 5% *
- REALTIME FFT spectrum display
- High-performance DSP (Digital Signal Processor)
- 3D magnetic field measurement
- Frequency and signal strength display!
- High-resolution multi-function display
- DIN/VDE 0848 Exposure limit calculation!
- Internet Flash Software-Updates
- **USB 2.0 Interface**
- Simultaneous M-Display X, Y, Z axes
- Average (AVG) measurement
- PEAK Hold
- Incl. battery, charger & aluminum transportcase
- Dimensions (L/W/D): (260x86x23) mm
- Weight: 420gr
- **Warranty: 10 years**

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### Application Examples Spectran NF-10xx Spectrum Analyzer

- Analysis and measurement of:
  - traction power
  - power lines
  - power cables
  - harmonics

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![CE Mark](image)

![USB 2.0 Ready](image)
Description

CONFORMING TO STANDARDS

Real ANALYSIS:
Measurement of electric and magnetic fields in this price range has never been professional. Find radiation sources in your surroundings. Find their respective frequencies and signal strengths, including direct display of exposure limits. This used to be impossible in this price category, professional units often costing several thousand euros and being excessively complicated in handling. The highly complex calculations in spectrum analysis incl. exposure limit calculation is being performed, unnoticed in the background, by a high-performance DSP (digital signal processor).

Fast, handy, cost-effective, beautiful exterior and PRECISION - what more could you ask?

Spectrum ANALYSIS
Real ANALYSIS:
Professional EMF measurement devices use a frequency dependant measurement approach, the so-called spectrum analysis. In a certain frequency range, the individuals signals and their respective strengths are being broken down, for example into a "bargraph" display (see SPECTRAN® screenshot on the right). The height of the individual bars represents the corresponding signal strength. For the 3 strongest signal sources, SPECTRAN® can automatically displays the frequency and signal level, thanks to its "Auto Marker" feature. Of course, you can also setup the filter width and the frequency range to be analysed as you like.

In the EMF (LF) spectrum shown here, a frequency range of approx. 20Hz to 60Hz from left to right is being analysed. During analysis, the Auto Marker feature has determined - fully automatic - two main signal sources:

Signal#1=30Hz at 45µT
Signal#2=50 (mains power) at 75µT

EXPOSURE LIMITS

At the push of a button:
Exposure limit calculation used to be a complex and awkward procedure even for the professional, as most of the time, a chaotic mixture of an abundance of different frequencies, modulations and signal strengths is present. The indispensable, highly complex calculation of frequency-dependant exposure limits can ONLY be performed CONFORMING TO STANDARDS by a spectrum analyser with high-performance software. Not a problem for SPECTRAN® units: They can calculate even several authoritative exposure limits, precautionary limits and recommendations (simply selectable via a button) and display these as a practical bargraph display (including convergence display in percent!), while the measurement is running.

The attached SPECTRAN® screenshot demonstrates how it works: At the push of a button, the ICNIRP exposure limit has been chosen among the various available exposure limits. SPECTRAN® now automatically calculates convergence or excess of this limit. For achieving this, often thousands of complex calculations have to be performed per second, and a steady scan of the entire frequency range needs to be performed. A true nightmare for every processor. In our test case, the graphic display shows an approximation towards the ICNIRP limit by 6.06%. If you use a NF-5030 you can even cover the total ICNIRP-banwidth (depending on frequency). Hence, even the novice can perform exposure limit calculations ACCORDING TO STANDARDS without having to use complex tables and calculators.

Graphic display of frequency-dependant exposure limits.
Lots of power: The rechargeable Aaronia NiMH battery

Superlong operating time:
The Aaronia NiMH high-performance battery has been developed specifically for the SPECTRAN® devices and is optimally suited for their requirements. Thanks to NiMH technology, the dreaded “Memory effect” is now a thing of the past, as with this power battery, maximum quality and long life have been our primary goals. Another reason why such a battery technology is necessary is the high power demand of the high-performance DSP used in all SPECTRAN® units, especially in the RF versions, which furthermore include very demanding RF receiving circuitry. Still, it is astounding that even when using the standard version of the Aaronia battery (1300mAh), continuous operation of the SPECTRAN® for approx. 4 hours is possible. The special version with 2200mAh (available at an extra charge) bumps this up to a stunning 7 hours! This is certainly a new all-time record for portable, battery-supplied spectrum analysers, or do you know a portable spectrum analyser which even remotely provides 7 hours of continuous operation with a single battery charge?

Naturally, the necessary battery charger is also included. At the same time, it can be used for operating the SPECTRAN® units with mains power. The battery charger is integrated into all SPECTRAN® units.

The new standard: 3D MEASUREMENT

Mismeasurement caused by wrongly adjusting the measurement device in space or troublesome and complex 3D calculations with a calculator are a problem of the past from now on, thanks to SPECTRAN® EMF (LF) measurement devices. All SPECTRAN® EMF measurement devices can measure magnetic fields directly in 3D! Starting with the SPECTRAN® NF-1010E, field strengths of the individual X, Y and Z axes can even be shown separately. This has become possible thanks to the newest development from the Aaronia laboratories: Our high-tech REAL 3D miniature sensor coil. Consisting of a specially crafted nylon base with 3 independant windings made of ultra-thin, 0,05 mm! wire, it impresses with its extremely high sensitivity. It allows measurement of magnetic fields in all 3 spacial dimensions. The signal processor (DSP) of the SPECTRAN® performs the resulting highly complex calculations. You receive 3D measurement results which can otherwise only be achieved by using highly professional equipment.

INCLUDED WITH DELIVERY

- LF spectrum analyser SPECTRAN NF-10xx
- Sturdy aluminum-design carrycase (with custom padding!)
- 1300mAh Aaronia power battery with charger
- Exhaustive manual with lots of basic information, hints and exposure limit tables (PDF-document)
## Specifications

<table>
<thead>
<tr>
<th>Specifications base unit(1)</th>
<th>NF-1010</th>
<th>NF-1010E</th>
<th>NF-3010</th>
<th>NF-3020</th>
<th>NF-5010</th>
<th>NF-5030</th>
<th>NF-XFR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency Range (min)</strong></td>
<td>10Hz</td>
<td>10Hz</td>
<td>10Hz</td>
<td>10Hz</td>
<td>1Hz</td>
<td>1Hz</td>
<td>1Hz</td>
</tr>
<tr>
<td><strong>Frequency Rance (max)</strong></td>
<td>2kHz</td>
<td>10kHz</td>
<td>10kHz</td>
<td>40kHz</td>
<td>1MHz</td>
<td>1MHz</td>
<td>30MHz</td>
</tr>
<tr>
<td><strong>Electric field [V/m] (min) (typical)</strong></td>
<td>1V/m</td>
<td>1V/m</td>
<td>1V/m</td>
<td>1V/m</td>
<td>1V/m</td>
<td>1V/m</td>
<td>0.1V/m</td>
</tr>
<tr>
<td><strong>Electric field [V/m] (max) (typical)</strong></td>
<td>2.000V/m</td>
<td>2.000V/m</td>
<td>5.000V/m</td>
<td>5.000V/m</td>
<td>20kV/m</td>
<td>see opt. PBS2</td>
<td></td>
</tr>
<tr>
<td><strong>Magnetic field [Tesla] (min) (typical)</strong></td>
<td>10nT</td>
<td>10nT</td>
<td>1nT</td>
<td>1nT</td>
<td>1nT</td>
<td>1T</td>
<td>1pT</td>
</tr>
<tr>
<td><strong>Magnetic field [Tesla] (max) typical</strong></td>
<td>100µT</td>
<td>100µT</td>
<td>100µT</td>
<td>100µT</td>
<td>100µT</td>
<td>see opt. PBS2</td>
<td></td>
</tr>
<tr>
<td><strong>Magnetic field [Gauss] (min) (typical)</strong></td>
<td>100µG</td>
<td>100µG</td>
<td>10µG</td>
<td>10µG</td>
<td>10µG</td>
<td>10µG</td>
<td>10G</td>
</tr>
<tr>
<td><strong>Magnetic field [Gauss] (max) typical</strong></td>
<td>1G</td>
<td>1G</td>
<td>1G</td>
<td>1G</td>
<td>1G</td>
<td>see opt. PBS2</td>
<td></td>
</tr>
<tr>
<td><strong>Analog input [V] (min) typical</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2µV</td>
<td>2µV</td>
<td>200nV</td>
</tr>
<tr>
<td><strong>Analog input [V] (max) typical</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>200mV</td>
<td>200mV</td>
<td>2V</td>
</tr>
<tr>
<td><strong>RBW (resolution bandwidth) (min)</strong></td>
<td>1Hz</td>
<td>1Hz</td>
<td>1Hz</td>
<td>1Hz</td>
<td>1Hz</td>
<td>1Hz</td>
<td>0.3Hz</td>
</tr>
<tr>
<td><strong>RBW (resolution bandwidth) (max)</strong></td>
<td>1kHz</td>
<td>3kHz</td>
<td>30kHz</td>
<td>100kHz</td>
<td>100kHz</td>
<td>30kHz</td>
<td>1MHz</td>
</tr>
<tr>
<td><strong>Demodulator</strong></td>
<td>-</td>
<td>-</td>
<td>AM</td>
<td>AM</td>
<td>AM/FM</td>
<td>AM/FM</td>
<td>AM/FM</td>
</tr>
<tr>
<td><strong>Units (additional units via PC software)</strong></td>
<td>V/m, T, G</td>
<td>V/m, T, G</td>
<td>V/m, T, G</td>
<td>V/m, T, G</td>
<td>V/m, T, G, A/m</td>
<td>V/m, T, G, A/m</td>
<td>V, dBV</td>
</tr>
<tr>
<td><strong>Detector</strong></td>
<td>RMS</td>
<td>RMS</td>
<td>RMS/MinMax</td>
<td>RMS/MinMax</td>
<td>RMS/MinMax</td>
<td>RMS/MinMax</td>
<td>RMS/MinMax</td>
</tr>
<tr>
<td><strong>Internal Datalogger (size). Expandable to 1MB (option 001)</strong></td>
<td>-</td>
<td>-</td>
<td>64k</td>
<td>64k</td>
<td>64k</td>
<td>64k</td>
<td>unlimited</td>
</tr>
<tr>
<td><strong>FFT resolution (points)</strong></td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>1024</td>
<td>1024</td>
<td>1024</td>
</tr>
<tr>
<td><strong>Lowest Sample Time</strong></td>
<td>50mS</td>
<td>50mS</td>
<td>50mS</td>
<td>50mS</td>
<td>10mS</td>
<td>10mS</td>
<td>10mS</td>
</tr>
<tr>
<td><strong>Accuracy (typical)</strong></td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
</tr>
</tbody>
</table>

### Highlights

- Real-time remote control via USB
- Integrated electric (E) & isotropic magnetic (H) sensor/antenna
- 3D, 2D or 1D mode switchable (only magnetic field sensor)
- Calibration setup (selected antenna)
- Exposure limit calculation according to ICNIRP, BGV B11, BlnSchV etc.
- Extended full ICNIRP range
- Suitable for Pre-Compliance test
- Real-time limit calculation with simultaneous percentage display
- Vector power measurement (VQ) and True RMS
- Enhanced DFT spectrum analysis
- Simultaneously displays frequency and signal strength
- Up to 3 marker (showing both frequency and field strength)
- Jog Dial controlled manual marker readout
- Linear or logarithmic spectrum display (log10, log100, log1000)
- Automatic reference level adjustment (switchable)
- Hold function
- Free of charge firmware update (via Intenet)
- Supports programming of custom P-Code & C++ based custom software
- High performance DSP (Digital Signal Processor)
- Large, high resolution multifunctional LCD (95mm)
- Spectrum display (51x25 pixel)
- High resolution 50 segment bargraph (trend display)
- Enhanced, much sharper Aoron A LCD display (3d generation)
- Integrated battery charger (supports our optional LiPo battery)
- Internal speaker

Please continue on next page

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(1) Specifications subject to change without further notice, errors excepted. Subject to our most current terms and conditions.
## Connectors / Interface

<table>
<thead>
<tr>
<th></th>
<th>Entrance</th>
<th>Intermediate</th>
<th>Professional</th>
<th>Outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMA input (f) with high impedance</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>USB 1.1/2.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2x</td>
</tr>
<tr>
<td>Audio output (2.5mm jack)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.5mm jack</td>
</tr>
<tr>
<td>Charger plug (max. 15V)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jog Dial (easy usage of menu, marker and volume control)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Key &amp; touchpad</td>
</tr>
<tr>
<td>1/4&quot; tripod connector</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

## Included In Delivery

- Integrated electric (E) & isotropic magnetic (H) sensor/antenna
- SPECTRAN 1300mAh rechargeable battery (integrated)
- Battery charger and power supply incl. international adapter set
- Aluminum carrying case with foam protection
- Detailed English manual (on CD)
- Analyzer Software for MAC-OS, Linux and Windows (on CD)
- SMA tool
- Harddisk
- No adapter set
- Key & touchpad
- In-Vehicle docking

## Available Options (extra charge)

| Option 001 | 1MB memory expansion | -        | -            | -            | -            | -            | -            | -            | -            |
| Option 005 | 12Bit DDC for ultra high sensitivity | -        | -            | -            | 6 cell battery |
| Option 006 | (Isotropic static magnetic field sensor) | -        | -            | -            | -            | -            | -            | -            | -            |
| Option 008 | 20MHz expansion. New range: 1Hz-20MHz | -        | -            | -            | -            | -            | -            | -            | -            |
| Option 009 | 24Bit resolution for Option 006 | -        | -            | -            | -            | -            | -            | -            | -            |
| Option 010 | 30MHz expansion. New range: 1kHz-30MHz | -        | -            | -            | -            | -            | -            | -            | -            |
| Option UBBV2 | 40dB external preamplifier DC-8GHz | -        | -            | -            | -            | -            | -            | -            | -            |

## Optional Accessories

- USB Cable (Special Version)
- 3000mAh Lithium Polymer (LiPo) Power-Battery
- Car Power Adapter (operate or charge via cigarette lighter)
- Outdoor Rubber Protection (perfect for outdoor usage)
- Pistol Grip / Miniature Tripod
- Aluminum Tripod (big version)
- DC-Blocker (protects the input against DC voltage)
- 20dB Attenuator (offers a higher maximum voltage up to 2V)
- PBS1 Near Field Probe Set (passive)
- PBS2 Near Field Probe Set (active, incl. UBBV2 preamplifier)
- ADP1 Active Differential Probe (conductive measurement)
- GEO10 Vibrationsensor (4Hz-1kHz)
- GEO14 Vibrationsensor (10Hz-1kHz)
- Calibration Certificate
- Heavy Plastic Carrying Case

### Notes

- Preliminary specifications dated 01.02.2011. The NF and XFR series are available with latest Beta firmware. The Beta firmware is constantly in development. Some functionality may still be limited and not fully to specifications (Beta status). By regularly checking our homepage for updates, you can always keep your measurement device up-to-date. As soon as V1.0 of the firmware is released, all functionality and features will be fully available. Range, sensitivity and accuracy can change depending on frequency, setup, antenna and used parameters. Precision datas are based on Aaronias calibration-reference under specific test conditions. Unless otherwise stated, these specifications are according to the following reference conditions: Ambient temperature 22±3°C, relative air humidity 40% to 60%, continuous wave signal (CW), RMS detection.
- Option 006 offers a range of 100µG-6G (10nT-600µT).
- You can “zero” the static field sensor (Option 006) by using our “Zero Gauss” chamber.
- Option 008 offers a range of 100µG-6G (10nT-600µT).
- NF-1010 NF-1010E NF-3010 NF-3020 NF-5030 NF-XFR

© Aaronia AG, Gewerbegebiet Aaronia AG, DE-54597 Euscheid, Germany, Phone ++49(0)6556-93033, Fax ++49(0)6556-93034, mail@aaronia.de, www.aaronia.com

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Recommended accessories for Aaronia Spectrum Analyzer

Heavy Plastic Carrycase PRO
Shock resistant, heavy version with padding. Offers spaces for 2 SPECTRAN units with all accessories and a HyperLOG 70xx or 60xx antenna. A MUST for the professional user or outdoor usage!
Order/Art.-No.: 243

Pistol grip / miniature tripod
Detachable handle with super-practical miniature tripod mode: this handle is attachable to the backside of the unit and allows optimal handling (esp. for directional measurement) and even fixed installation of the unit. STRONGLY recommended for PC use!
Order/Art.-No.: 280

Aluminum tripod
Height adjustable, high stability. STRONGLY recommended for PC use! Max. height: 105cm.
Order/Art.-No.: 281

Calibration Certificate
Available for all SPECTRAN® units. With detailed calibration sheet.
Order/Art.-No.: 784

USB Cable (Special Version)
To connect your Spectran to the PC. Special version with high performance EMC-ferrite. STRONGLY recommended for PC use!
Order/Art.-No.: 774

Protection rubber
Protect and personalize your SPECTRAN with a sturdy rubber case and keep it scratch-n-dent free. Allows full access to all functions.
Order/Art.-No.: 290

3000mAh LiPo Power-Battery
Offers a MUCH higher runtime of your SPECTRAN (up to 400%). Strongly recommended for autonomic measurement! The 1300mAh standard-battery will be replaced.
Order/Art.-No.: 254

Car power adapter for mobile use
With power-LED. For charging batteries or operating our units in your car, including special plug.
Order/Art.-No.: 260

DC-Blocker (SMA)
It prevents the RF-input of the SPECTRAN to be destroyed by the DC-voltages of f.e. DSL/ISDN lines.
Order/Art.-No.: 778

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Order/Art.-No.: 778
Frequency overview Analyzer & Antennas
References

User of Aaronia Antennas and Spectrum Analyzers (Examples)

Government, Military, aeronautic, astronautic
- NATO, Belgien
- Boeing, USA
- Airbus, Hamburg
- Bund (Bundeswehr), Leer
- Bundeswehr (Technische Aufklärung), Hof
- Lufthansa, Hamburg
- DLR (Deutsches Zentrum für Luft- und Raumfahrt, Stuttgart
- Eurocontrol (Flugüberwachung), Belgien
- Australian Government Department of Defence, Australien
- EADS (European Aeronautic Defence & Space Company) GmbH, Ulm
- Institut für Luft- und Raumfahrtmedizin, Köln
- Deutscher Wetterdienst, Tauche
- Polizeipräsidium, Bonn
- Landesamt für Umweltschutz Sachsen-Anhalt, Halle
- Zentrale Polizeitechnische Dienste, NRW
- Bundesamt für Verfassungsschutz, Köln
- BEV (Bundesamt für Eich- und Vermessungswesen)

Industry
- Shell Oil Company, USA
- ATI, USA
- Fedex, USA
- Walt Disney, Kalifornien, USA
- Agilent Technologies Co. Ltd., China
- Motorola, Brasilien
- IBM, Schweiz
- Audi AG, Neckarsulm
- BMW, München
- Daimler Chrysler AG, Bremen
- BASF, Ludwigshafen
- Deutsche Bahn, Berlin
- Deutsche Telekom, Weiden
- Siemens AG, Erlangen
- Rohde & Schwarz, München
- Infineon, Österreich
- Philips Technologie GmbH, Aachen
- ThyssenKrupp, Stuttgart
- EnBW, Stuttgart
- RTL Television, Köln
- Pro Sieben – SAT 1, Unterföhring
- Channel 6, Großbritannien
- WDR, Köln
- NDR, Hamburg
- SWR, Baden-Baden
- Bayerischer Rundfunk, München
- Carl-Zeiss-Jena GmbH, Jena
- Anritsu GmbH, Düsseldorf
- Hewlett Packard, Dornach
- Robert Bosch GmbH, Plochingen
- Mercedes Benz, Österreich
- EnBW Kernkraftwerk GmbH, Neckarwestheim
- AMD, Dresden
- Infineon Technologies, Regensburg
- Intel GmbH, Feldkirchen
- Philips Semiconductors, Nürnberg
- Hyundai Europe, Rüsselsheim
- Saarschmiede GmbH, Völklingen
- Wilkinson Sword, Solingen
- IBM Deutschland, Stuttgart
- Vattenfall, Berlin
- Fraport, Frankfurt

Research/Development, Science and Universities
- Deutsches Forschungszentrum für Künstliche Intelligenz, Kaiserslautern
- Universität Freiburg
- Indonesien Institute of Sience, Indonesien
- Max-Planck-Institut für Polymerforschung, Mainz
- Los Alamos National Laboratory, USA
- University of Bahrain, Bahrain
- University of Florida, USA
- Universität Erlangen, Erlangen
- Universität Hannover, Hannover
- University of Newcastle, Großbritannien
- Universität Strasbourg, Frankreich
- Universität Frankfurt, Frankfurt
- Uni München – Fakultät für Physik, Garching
- Technische Universität Hamburg, Hamburg
- Max-Planck Institut für Radioastronomie, Bad Münstereifel
- Max-Planck-Institut für Quantenoptik, Garching
- Max-Planck-Institut für Kernphysik, Heidelberg
- Max-Planck-Institut für Eisenforschung, Düsseldorf
- Forschungszentrum Karlsruhe, Karlsruhe