



Rev 1.3  
24.03.2010

# REALTIME spectrum analyzer SPECTRAN® 30xx series

measure electric and magnetic fields



## 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.**



**AARONIA AG**  
WWW.AARONIA.DE

Made in Germany

# Specifications

## SPECTRAN® NF-3010 (10Hz to 100kHz)

- ◆ Frequency range: 10Hz to 100kHz\*
- ◆ Typ. level range E-Field: 0,1V/m to 5.000 V/m\*
- ◆ Typ. level range H-Field: 1nT to 100.000nT\*
- ◆ Typ. precision: 5% \*
- ◆ Superfast FFT spectrum analysis
- ◆ High-performance DSP (Digital Signal Processor)
- ◆ 3D magnetic field measurement
- ◆ Simultaneous M-Display X, Y, Z axes
- ◆ True RMS signal strength measurement
- ◆ Average (AVG) measurement
- ◆ PEAK Hold
- ◆ Frequency and signal strength display
- ◆ High-resolution multi-function display
- ◆ "Clear text" signal identification
- ◆ DIN/VDE 0848 Exposure limit calculation
- ◆ Internal data logger
- ◆ Multi-function controls (single hand usage)
- ◆ USB 2.0 Interface
- ◆ Internet Flash Software-Updates
- ◆ Incl.battery, charger & aluminum transportcase
- ◆ Dimensions (L/W/D): (260x86x23) mm
- ◆ Weight: 420gr
- ◆ **Warranty: 10 years**

## SPECTRAN® NF-3020 (10Hz to 400kHz)

- ◆ Frequency range: 10Hz to **400kHz**\*
- ◆ Typ. level range E-Field: 0,1V/m to 5.000 V/m\*
- ◆ Typ. level range H-Field: 1nT to 100.000nT\*
- ◆ Typ. precision: 5% \*
- ◆ Superfast FFT spectrum analysis
- ◆ High-performance DSP (Digital Signal Processor)
- ◆ 3D magnetic field measurement
- ◆ Simultaneous M-Display X, Y, Z axes
- ◆ True RMS signal strength measurement
- ◆ Average (AVG) measurement
- ◆ PEAK Hold
- ◆ Frequency and signal strength display
- ◆ High-resolution multi-function display
- ◆ "Clear text" signal identification
- ◆ DIN/VDE 0848 Exposure limit calculation
- ◆ Internal data logger
- ◆ Multi-function controls (single hand usage)
- ◆ USB 2.0 Interface
- ◆ Internet Flash Software-Updates
- ◆ Incl.battery, charger & aluminum transportcase
- ◆ **External SMA signal input**
- ◆ Dimensions (L/W/D): (260x86x23) mm
- ◆ Weight: 420gr
- ◆ **Warranty: 10 years**

## Application Examples Spectran NF-30xx Spectrum Analyzer

### Analysis and measurement of:

- ◆ traction power
- ◆ power lines
- ◆ power cables
- ◆ lamps
- ◆ power supplies
- ◆ transformer
- ◆ monitors



# Description

## CONFORMING TO STANDARDS

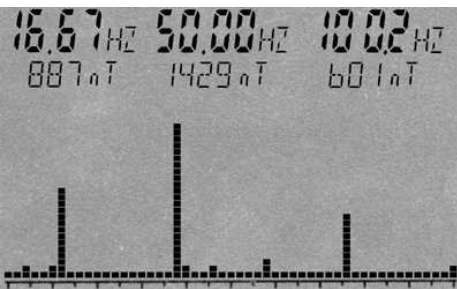
### Real ANALYSIS:

Measurement of electric and magnetic fields in this price range has never been this 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 ?**



LF spectrum display and automatic multi-marker display on the digital screen of SPECTRAN® (Screenshot)

## 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:

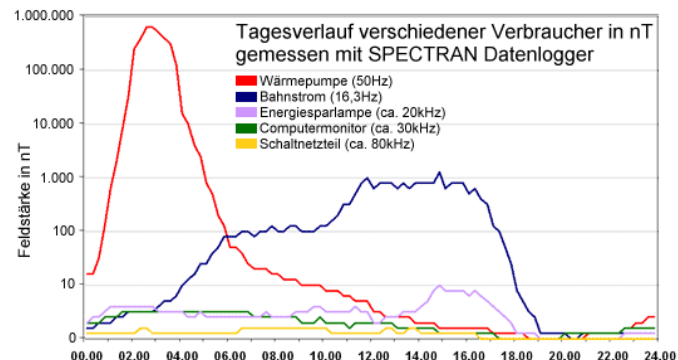
**Signal#1=30Hz at 45µT**

**Signal#2=50 (mains power) at 75µT**

## LONG-TERM MEASUREMENT (Data logging feature)

SPECTRAN® measurement devices with data logger allow long-term recordings of measurement results over a freely adjustable period of time. This is particularly indispensable for serious evaluation of exposure by appliances and machinery which have a changing power consumption or radiation strength over time. Examples for these include railroads, power lines and plants, but also home appliances and their respective power cables, and various high-frequency transmission facilities like mobile phone transmission towers, mobile phones, radar etc. Depending on the time of day, considerable variation of exposure can occur (see attached graphics). Without long-term recordings, MASSIVE misinterpretation of total exposure can occur. With long-term data logging using SPECTRAN®, the daily variation of exposure can be recorded and analysed. Thus, the actual total exposure can be evaluated precisely.

With this functionality, you can even discover sporadic EMC problems which would otherwise be very hard to detect.



Daily variation of various radiation sources discloses MASSIVE variation in exposure

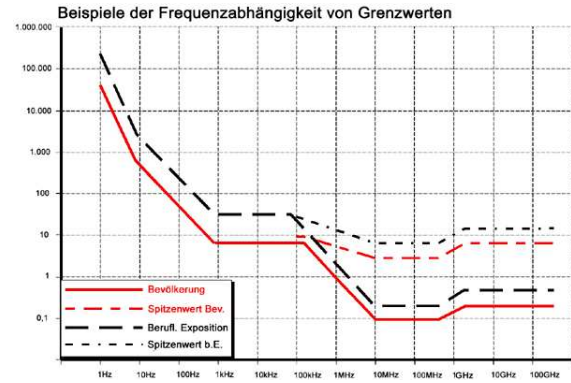
## EXPOSURE LIMITS

### At the push of a button:

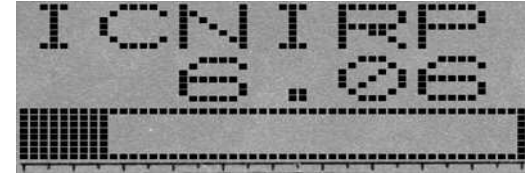
Exposure limit calculation used to be a complex and awkward procedure even for the professional, as most of the time, a chaotic mixture of an abundance of different frequencies, modulations and signal strengths is present.

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.

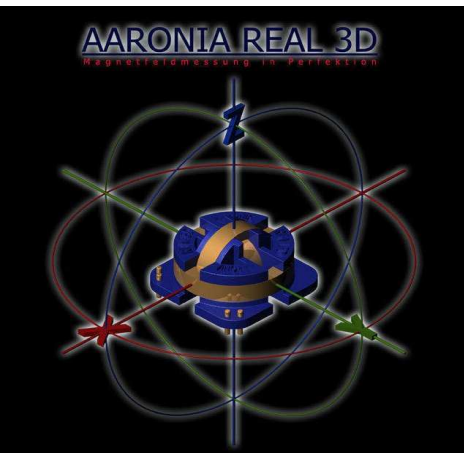
The attached SPECTRAN® screenshot demonstrates how it works: At the push of a button, the ICNIRP exposure limit has been chosen among the various available exposure limits. SPECTRAN® now automatically calculates convergence or excess of this limit. For achieving this, often thousands of complex calculations 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.



SPECTRAN® displays exposure limits both as percentage as well as a bargraph display.



Aaronia REAL-3D magnetic field sensor

## 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 independent 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-30xx
- ◆ 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)



Package contents SPECTRAN 30xx devices

# Overview of features SPECTRAN NF Spectrum Analyzer

SPECIFICATIONS base unit*	NOVICE		INTERMEDIATE		PROFESSIONAL		OUTDOOR
	NF-1010*	NF-1010E*	NF-3010*	NF-3020*	NF-5010*	NF-5030*	NF-XFR*
Frequency range Min	10Hz	10Hz	10Hz	10Hz	1Hz	1Hz	1Hz
Frequency range Max	2kHz	10kHz	100kHz	400kHz	1MHz	30MHz**	20MHz
Range electrical field [V/m] (typical) Min (1D)	1V/m	1V/m	0,1V/m	0,1V/m	0,1V/m	0,1V/m	-
Range electrical field [V/m] (typical) Max (1D)	2.000V/m	2.000V/m	5.000V/m	5.000V/m	5.000V/m	20kV/m	-
Range magnetic field [Tesla] (typical) Min (3D!)	10nT	10nT	1nT	1nT	1nT	1pT**	-
Range magnetic field [Tesla] (typical) Max (3D!)	100µT	100µT	100µT	100µT	100µT	2mT	-
Range magnetic field [Gauss] (typical) Min (3D!)	100µG	100µG	10µG	10µG	10µG	10nG**	-
Range Analog input (typical) Min	-	-	-	2µV	2µV	200nV	200nV
Range Analog input (typical) Max	-	-	-	200mV	200mV	200mV	200mV
Range magnetic field [Gauss] (typical) Max (3D!)	1G	1G	1G	1G	1G	20G	-
Filter bandwidth Min	5Hz	5Hz	1Hz	1Hz	1Hz	1Hz	1Hz
Filter bandwidth Max	10kHz	100kHz	300kHz	300kHz	1MHz	1MHz	1MHz
Accuracy base unit (typical)	5%	5%	5%	5%	3%	3%	3%
FFT (Resolution in points)	64	64	64	64	1024	1024	1024
Vector power measurement (I/Q) and True RMS	-	-	✓	✓	✓	✓	✓
<b>FEATURES</b>							
Standards conformant exp. limits (ICNIRP, BGV B11, BlmSchV etc.)	-	✓	✓	✓	✓	✓	-
Extended full ICNIRP range	-	-	-	-	-	✓	-
Isotropic (3D) AC magnetic field measurement	✓	✓	✓	✓	✓	✓	-
Supports custom P-Code software	-	-	✓	✓	✓	✓	✓
ADVANCED HOLD mode (HOLD function)	-	✓	✓	✓	✓	✓	✓
INTERNAL data logger (long-term measurements)	-	-	✓	✓	✓	✓	64GB
FLASH memory including firmware update (over the Internet)	-	16k	64k	64k	64k	64k	✓
"Clear text" signal identification with direct frequency display	-	✓	✓	✓	✓	✓	✓
Integrated battery charging circuitry	-	✓	✓	✓	✓	✓	✓
Internal speaker	Piezo	Piezo	✓	✓	✓	✓	✓
Audio demodulation	AM	AM	AM	AM	AM&FM	AM&FM	-
<b>DISPLAY</b>							
Fast FFT or DFT spectrum analyses	-	✓	✓	✓	✓	✓	✓
Limit calculation with simultaneous percentage display	✓	✓	✓	✓	✓	✓	-
X, Y, Z Axis display or Vectorproduct (only M.-Field)	-	✓	✓	✓	✓	✓	-
Main display in V/m, Tesla, Gauss or A/m (switchable)	-	✓	✓	✓	✓	✓	V / dBµV
High-resolution 50 segment bargraph (trend display)	✓	✓	✓	✓	✓	✓	14" Display
3fold marker display (ex. 3x field strength & frequency at once)	-	✓	✓	✓	✓	✓	10fold
<b>INTERFACES / CONNECTORS</b>							
Fast USB 2.0 interface (computer connection)	-	✓	✓	✓	✓	✓	2x
Audio output	✓	✓	✓	✓	✓	✓	-
DC input (max. 15V) for external power supply	✓	✓	✓	✓	✓	✓	✓
External ultra sensitive signal input (SMA input) with max. 0,2V	-	-	-	✓	✓	✓	✓
Jog Dial (Multi-functional dial) for "one-hand operation"	-	-	✓	✓	✓	✓	Key&Touchpad
<b>OPTIONS (extra charge)</b>							
Option 001 (1MB memory expansion)	-	-	-	-	✓	✓	harddisk
Option 005 (12Bit DDC / offers ultra high sensitivity up to 1pT)	-	-	-	-	-	✓	inclusive
Option 006 (Measure 3D static magnetic fields)*	-	-	-	-	-	✓	-
Option 009 (Ultra high 24Bit resolution on static magnetic fields)	-	-	-	-	-	✓	-
Option 010 (Expanded frequency range up to 30MHz e.g. RFID)	-	-	-	-	-	✓	20MHz incl.
<b>INCLUDED ACCESSORIES (in addition to the base unit)</b>							
Aaronia 7,2V high-performance battery (1300mAh) + charger	-	✓	✓	✓	✓	✓	6 cell battery
Aluminum design transport case incl. padding inlays	-	✓	✓	✓	✓	✓	-
PROFESSIONAL PC analysis software (Windows, downloadable)	-	✓	✓	✓	✓	✓	installed

\*Preliminary specifications as of 12.03.2009. NF and XFR series are available with latest BETA-Firmware. ALL options are available for the NF-series. The BETA firmware is in continuous 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 version 1.0 of the firmware is released, all functionality and features will be fully available.

Range and accuracy can change depending on frequency, sensor and used parameters. Precision values are based on Aaronia calibration-reference and only valid under specific test conditions. Unless otherwise stated, these specifications apply for the reference condition: 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.

\*\*Standard: 1MHz. Only with option 010 up to 30MHz. / Standard: 1nT. Only with option 005 up to 1pT.

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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





# References

## User of Aeronia 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)

### Research/Development, Science and Universitys

- ◆ Deutsches Forschungszentrum für Künstliche Intelligenz, Kaiserslautern
- ◆ Universität Freiburg
- ◆ Indonesien Institute of Sience, Indonesien
- ◆ Max-Planck-Institut für Polymerforschung, Mainz
- ◆ Los Alamos National Labratory, 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

### 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

# Visit us at the



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