

Rev 1.0  
04.03.2014

# Ultra Rugged Outdoor Spectrum Analyzer SPECTRAN® HF-XFR PRO (9kHz - 9,4GHz)

## Highlights

- ◆ Ultra robust Outdoor Spectrum Analyzer (IP65, up to -20°C) with integrated Notebook
- ◆ Extremely wide measuring range up to 9,4GHz
- ◆ Extra large 15,6" Widescreen Display (Full HD, 1920x1080) with Multi-touch Screen, sunlight readable (800 Nits-QuadraClear)
- ◆ Especially suitable for use even under the most difficult conditions
- ◆ Ultra low noise level up to -170dBm(1Hz) DANL
- ◆ Intel i7 with 8GB RAM & integrated GPS
- ◆ Built-in 3G Antenna with Sim-Card Reader (optional)



Made in Germany



# BUILT TO SURVIVE

The SPECTRAN HF-XFR PRO has been specifically designed for use in harsh conditions such as for military use, aerospace, mining, construction, research and development, even in the pouring rain, extreme temperatures and extremely dusty and dirty environments.

With this Spectrum Analyzer you can master all the challenges. It provides a powerful, extremely impact resistant Outdoor notebook as well as a high-end spectrum analyzer in one compact device. The HF-XFR PRO has been independently tested in accordance with MIL-STD-810G, IP65 and MIL-STD-461F.

The analyzer is based on a novel and patented by Aaronia method of spectrum analysis. The locating of interference sources and their causes , the determination of frequency and signal strength measurement and evaluation conform to the most complex limits - all this allows the SPECTRAN HF-XFR PRO .

Sunlight readable ♦

Ultra wide measurement range from 9kHz to 9,4GHz ♦



♦ 15,6" Widescreen Full HD Display with Multi-touch screen

♦ High quality magnesium alloy

♦ Sealed connectors and caps

♦ Built-in GPS

50 Ohm SMA RF connector ♦

♦ Intel i7 Processor with 8GB RAM

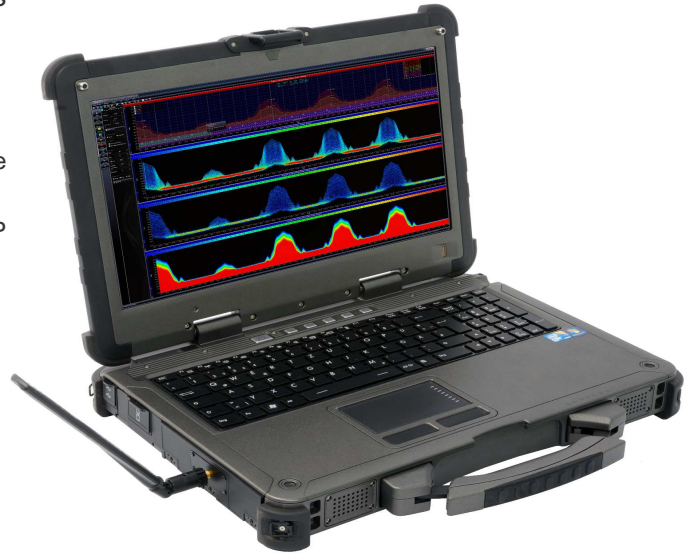
♦ 320GB HDD

# RF measurement at the highest level

The XFR PRO offers a huge variety of helpful functions for spectrum analysis

- ◆ Various trigger function and unlimited number of markers
- ◆ Different views: Spectrum, Waterfall, Histogram, Limits, time domain results
- ◆ Unlimited number of limit views e.g. EN55011, EN55022, ICNIRP etc. including display of limit lines and limit bar indicators
- ◆ Multi Window Support
- ◆ Powerful undo function
- ◆ Channel and provider display
- ◆ Custom skins and color settings
- ◆ Reporting and recording function
- ◆ Storage of personal sessions

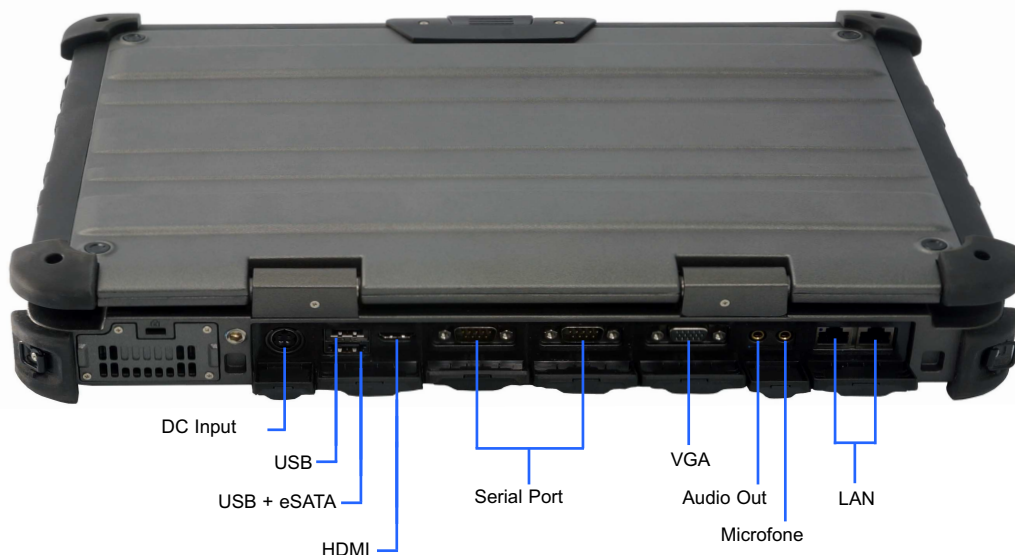
and much more ...



## Unmatched Performance

The powerful and ultra-stable Spectrum Analyzer is the first outdoor Spectrum Analyser its class with an Intel® i7 processor with 8GB RAM, full HD multi touch-screen, integrated GPS and ultra-low noise level up to -170dBm (Hz) DANL. The HF-XFR PRO is rugged and powerful at the same time.

- ◆ The thermal management system enables compliance with military standards for extreme temperatures. Simultaneously, the HF-XFR PRO offers industry-leading performance, thanks to the very latest Intel® i7 processors.
- ◆ The Turbo Boost feature increases the processor frequency to the active cores dynamically up to 3.33 GHz, and thus, the performance increase required for timely reaction to critical measurement data.
- ◆ With three USB 2.0 ports, a USB2.0/eSATA-combi-connector, two serial ports, two Ethernet ports and a VGA port - among other connections - offers the X500 a variety of interfaces to connect to the desired peripheral.





## Scope of delivery

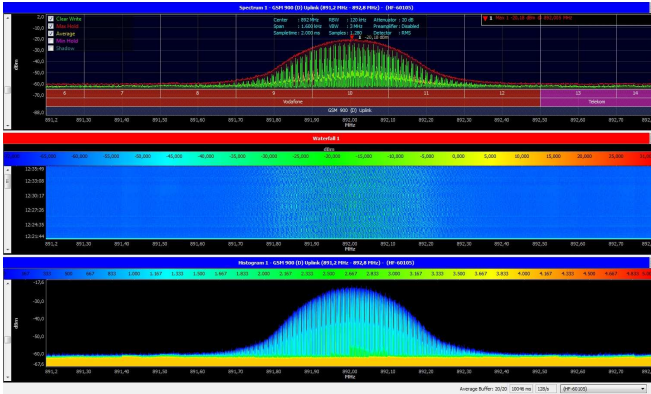
- ◆ SPECTRAN HF-XFR PRO Outdoor Spectrum Analyzer incl. Option 002 (TCXO timebase) & 020 (15dB preamp)
- ◆ HyperLOG 60100 directional antenna in black (680MHz to 10GHz) incl. pistol grip, 1m SMA cable & SMA tool
- ◆ OmniLOG 90200 omnidirectional antenna (700MHz to 2,5GHz)
- ◆ Rechargeable battery (installed)
- ◆ Battery charger / power supply
- ◆ English manual (on CD)

The HF-XFR PRO comes inclusive an extensive scope of delivery, depending on the necessity of the user the delivery can be extended to various additional products (see "Accessories").

# Functional Overview

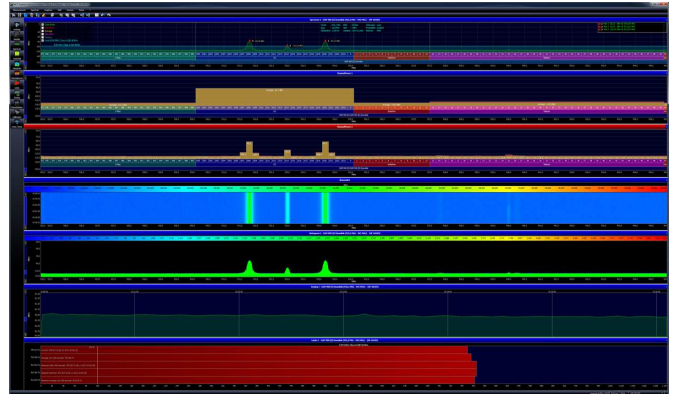
Below you will find an overview of the most important functions of the HF-XFR PRO. The software is constantly evolving, future updates are free of cost for all users.

## Spectrum Analysis



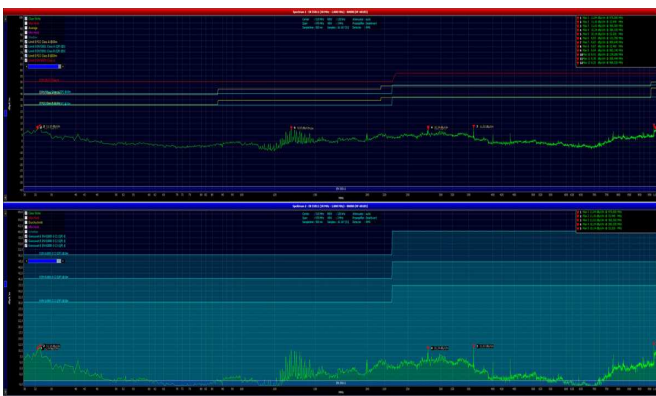
- ◆ High-resolution spectrum display of the current sweep, Average, Min / Max, Shadow, peak, RMS, etc.
- ◆ Provider display with many prestored providers, as well as an editor to edit or add Providers
- ◆ Marker function with unlimited number of different markers (min, max, delta, AVG, OBW..)
- ◆ Support of Styles and Skins, surface appearance can be adapted
- ◆ Intuitive drag and drop zoom, shortcuts etc.

## Multi Window



- ◆ The HF-XFR PRO supports an unlimited number of graphics (Spectrum, Waterfall, Histogram, etc.)
- ◆ The window size can be adjusted freely, therefore a full utilization of the FULL HD display is possible
- ◆ Simulate with only one HF-XFR PRO further measuring instruments to different measuring ranges (eg. 3G, WiFi and TETRA)

## Recording & Replay Mode



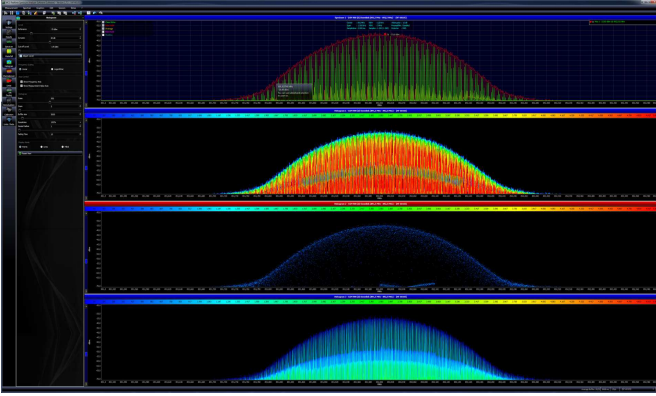
- ◆ Save your settings and complete measurements in Sessions
- ◆ Play recorded measurements in full length as often as needed with the convenient Replay function
- ◆ Print your measurement as PDF
- ◆ Export the data for further processing, eg in Excel
- ◆ Unlimited recording length allows 24/7 recordings without any "measurement gap"

## Limits



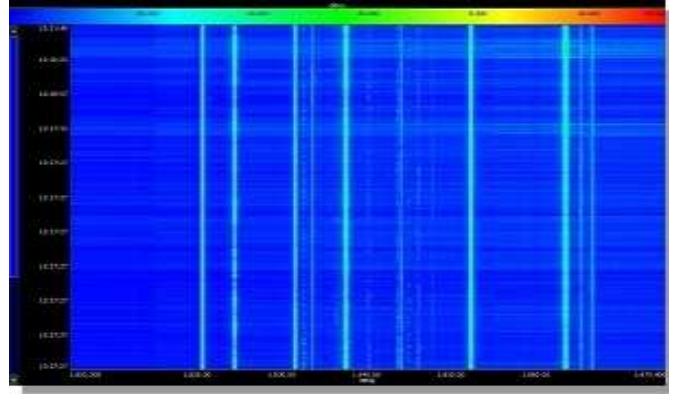
- ◆ Variety of pre-stored limits (eg EN55011, EN55022, ICNIRP... )
- ◆ Average, maximum calculation freely adjustable
- ◆ Limit editor for creating your own limits
- ◆ Trigger function, freely configurable alarm or messages when limits are exceeded
- ◆ Image suppression mode - suppression of external interference sources (eg GSM) to perform EMC measurements without anechoic chamber

## Histogram (dot, line and fill)



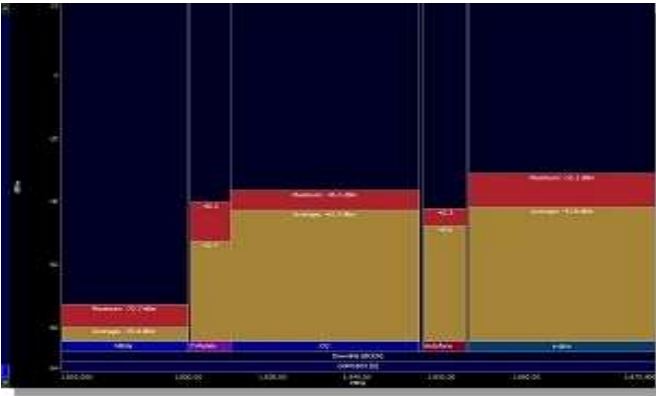
- ◆ Statistical view
- ◆ Perfect for identification and characterization of sporadically occurring events (bursts)
- ◆ Freely scalable and adaptable
- ◆ Represented as points, lines, or filled

## Waterfall



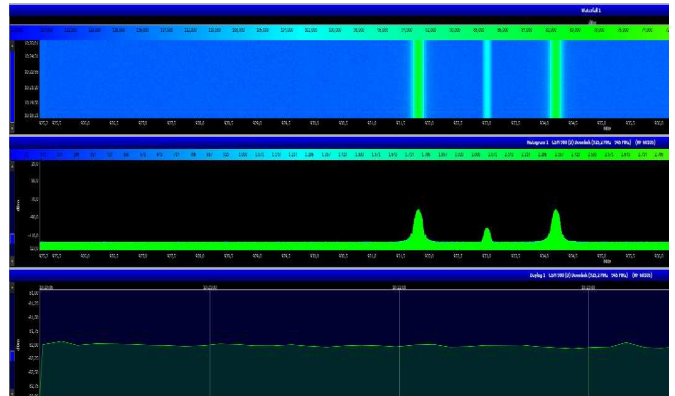
- ◆ Measurement data in the form of a "heat map" based on the frequency (X axis) and the time (Y-axis)
- ◆ Easier analysis of time-dependent signals, suitable for long-term recording
- ◆ Ongoing storage of the data to be able to recall past events by scrolling in the waterfall
- ◆ Freely scalable and adaptable

## Channel Power



- ◆ Allows the measurement of the signal strength in a frequency range - a channel bandwidth
- ◆ Perfect for the analysis of Wi-Fi, 3G, LTE or ZigBee channels
- ◆ Ideal for the determination of the strongest existing provider including Provider display
- ◆ AVG & Max display
- ◆ Freely scalable and adaptable

## Daylog



- ◆ Graphical trend / curve of the peak value over the entire measurement period
- ◆ Perfect for the measurement of systems in which the signal strength varies with time
- ◆ Time interval can be set freely
- ◆ Freely scalable and adaptable

## Application examples Spectran HF-60xxx Spectrum Analyzer

Analysis and measurement of:

- |                      |              |                              |                  |
|----------------------|--------------|------------------------------|------------------|
| ◆ 2G / GSM           | ◆ 3G / UMTS  | ◆ WLAN                       | ◆ WiFi           |
| ◆ WiMAX              | ◆ Radar      | ◆ PAR-Radar                  | ◆ UWB (FB1-FB12) |
| ◆ EMC pre-compliance | ◆ Radio & TV | ◆ TETRA / BOS                | ◆ ISM 434 & 868  |
| ◆ LTE                | ◆ Bluetooth  | ◆ Satellites (e.g. „L-Band“) | ◆ DECT           |

# Specification

## Spectrum Analysis

- ◆ Frequency range: 1MHz (9kHz with Option 900) to 9,4GHz
- ◆ 14Bit Dual-ADC
- ◆ DDC Hardware-Filter
- ◆ 150 MIPS DSP (CPU)
- ◆ AVG Noise Level (DANL): -170dBm(1Hz)
- ◆ AbsMax Level: +20dBm
- ◆ AbsMax Level: +40dBm (Option)
- ◆ Resolution (RBW) Min: 200Hz
- ◆ Resolution (RBW) Max: 50MHz
- ◆ EMC filter (RBW): 9kHz, 120kHz, 5MHz; 20MHz; 40MHz
- ◆ Smallest SampleTime: 1mS
- ◆ Typ. accuracy: +/- 1dB
- ◆ Vector (I/Q) / True RMS power measurement
- ◆ AM/FM/PM Demodulation
- ◆ Extended range to full ICNIRP
- ◆ Standardized limit calculation (ICNIRP, BGV B11, BlmSchV, EN55011 etc.)
- ◆ Fast ZERO-SPAN Sweep
- ◆ HOLD Mode
- ◆ Time-Slot-Analyzer
- ◆ Provider display
- ◆ Internal, switchable 15dB Preamplifier
- ◆ 0,5ppm TCXO timebase
- ◆ Incl. LogPer Antenna HyperLOG 60100 (680MHz to 10GHz)
- ◆ Incl. omnidirectional Antenna OmniLOG 90200 (700MHz to 2,5GHz)

## Hardware

- ◆ Intel i7-620M (4M Cache, 2,66GHz, max. 3,33GHz with Intel Turbo Boost Technology)
- ◆ 15,6" TFT-LCD (Full-HD 1080p) with Multi-touch screen, sun-light readable (800 Nits Quadra-Clear)
- ◆ Windows 7 64 Bit Professional
- ◆ 8GB RAM
- ◆ nVidia GT 330M 1GB DDR3 graphic card
- ◆ 320GB SATA HDD
- ◆ Intelligent lithium ion battery (8700mAh)
- ◆ Membrane keyboard with integrated numeric keypad and LED backlight
- ◆ Expansion slots: 2x PCMCIA Type II, 1x ExpressCard/54, 1 x Smart Card Reader I/O interface: 2x Serial port (9-pin, D - Sub), 1x External VGA port (15-pin, D -Sub), 1x microphone, 1x audio output (mini-jack), 1x DC input, 3x USB 2.0 (4 pin), 1x USB 2.0 / eSATA combo, 2x LAN (RJ45), 1x HDMI, 1x docking connector (80 - pin)
- ◆ Communication interfaces: 10/100/1000 BASE -T Ethernet Intel Centrino Advanced-N 6200, 802.11 a/b/g/n, GPS module + Tri - Passthrough
- ◆ Safety Features: Intel vPro technology, TPM1.2, fingerprint scanner, smart card reader, Kensington Lock
- ◆ Certification robustness: MIL -STD- 810G, IP65, MIL -STD- 461F, magnesium alloy casing, shock-proof removable hard drive, protection against vibration and shocks
- ◆ Dimension & weight: 410x290x65mm, 5,5kg
- ◆ Temperature range: Operating -20 °C to +55 °C, Storage : - 40 °C to +71 °C
- ◆ Humidity: 95% relative humidity, non-condensing
- ◆ 2 years warranty

# Options

## Included in delivery

### Option 020: Internal 15dB low-noise preamplifier

This option provides an internal, super low-noise 15dB preamplifier, enabling maximum performance particularly when measuring extremely weak signals. It is switched via a TRUE RF switch.

Order/Art.-No.: 177

### Option 002: 0,5PPM TCXO timebase

This highly precise TCXO timebase, which has been especially developed for the SPECTRAN®, offers significantly reduced phase noise (jitter). This will allow the use of far narrower filters (in development), which will in turn vastly enhance sensitivity. To fully exploit the maximum sensitivity this option is indispensable! Furthermore, the TCXO timebase allows far more accurate frequency measurement and display and is therefore a MUST-HAVE for future applications like time-domain measurements or code-selective measurement of UMTS, all already in development.

Order/Art.-No.: 181

## Available options (extra charge)

### Option 321: 40dB low-noise preamplifier (1MHz-10GHz)

This option provides an external, super low-noise 40dB preamplifier, enabling maximum performance particularly when measuring extremely weak signals at a EN55011, EN55022 or EN50371 EMC-test. If you use the BicoLOG antennas or the PBS1 Probeset this amplifier is a MUST HAVE to get the best performance!

Order/Art.-No.: 177-2

### Option 205: 10GHz peak power meter

This option augments the SPECTRAN® HF-XFR PRO with a power meter with up to 10GHz of bandwidth. Furthermore, it allows exact measurement of signal peaks with high crest factor like those occurring in WLAN technology, or extremely short signals, like RADAR bursts. What's more, measurement is performed in REAL TIME and BROADBAND, while at the same time being temperature-compensated. It is also an ideal solution for measurement of cable attenuation or receiver output. Depending on the actual frequency, the power meter provides a sensitivity of up to approx. -50dBm, while the maximum permissible level is +10dBm. By adding the 20dB attenuator (see price list), the maximum measurable signal level can be enhanced to +30dBm or +50dBm!

Order/Art.-No.: 182-5

### Option 015: Audio Signal Tracker

The Option 015 provides an acoustic representation of the signal intensity, similar to a Geiger counter. This allows a fast and convenient localization of the signal source. Perfectly suitable for signal direction finding, finding hidden transmitters or aligning antennas, especially in combination with the Peak Power Meter (Option 205). As a highlight, the dynamic can be adapted optimally by moving the reference level.

Order/Art.-No.: 178-1

### Option 900: 9kHz frequency extension

Extends the start frequency to 9 kHz. The new, usable frequency range with Option 900 is 9kHz - 9.4 GHz. Perfect for the measurement of conducted emissions according to interference standards such as EN55015, EN61800-3 etc.

Order/Art.-No.: 189-2



# Accessories

## Near field probe set (DC to 9GHz)

Passive or active Near-Field Probeset PBS1 or PBS2. Consisting of 5 Probes (4xH-Field, 1xE-Field), 40dB Preamplifier (only PBS2). Incl. Cable and transport case. Perfect for EMC near field tests.

Order/Art.-No.: 720 / 721



## OmniLOG 70600 (680MHz - 6GHz)

Omnidirectional Broadband Antenna with extremely wide frequency range from 680MHz to 6GHz. Small and lightweight, perfect for field strength measurements.

Order/Art.-No. : 733



## Aluminum tripod

Height adjustable, high stability. STRONGLY recommended for PC use! Max. height: 105cm. Perfect for the usage of the included HyperLOG Antenna.

Order/Art.-No.: 281



## Calibration Certificate

Available for all SPECTRAN® units. With detailed calibration sheet.

Order/Art.-No.: 785



## 1m / 5m / 10m SMA-Kabel

High quality special SMA cable for connecting any HyperLOG®-Antenna or BicoLOG®-Antenna with the RF Spectrum-Analyzer. Available as 1m, 5m and 10m Cable. All versions: SMA plug (male) / SMA plug (male).



## 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



## Calibration Resistor (DC-18GHz)

This calibration resistor is necessary for the best possible calibration of the noise-floor of each Spectran V4-Analyzer.

Order/Art.-No.: 779



## 20dB Attenuator (DC -18GHz)

Expands the measurement range to +40dBm.

Order/Art.-No.: 775



# References

## User of Aaronia Antennas and Spectrum Analyzers (Examples)

### Government, Military, Aeronautic, Astronautic

- ◆ NATO, Belgium
- ◆ Boeing, USA
- ◆ Airbus, Germany
- ◆ Bund (Bundeswehr), Germany
- ◆ Bundeswehr (Technische Aufklärung), Germany
- ◆ Lufthansa, Germany
- ◆ DLR (Deutsches Zentrum für Luft- und Raumfahrt, Germany)
- ◆ Eurocontrol (Flugüberwachung), Belgium
- ◆ Australian Government Department of Defence, Australia
- ◆ EADS (European Aeronautic Defence & Space Company) GmbH, Germany
- ◆ Institut für Luft- und Raumfahrtmedizin, Germany
- ◆ Deutscher Wetterdienst, Germany
- ◆ Polizeipräsidentium, Germany
- ◆ Landesamt für Umweltschutz Sachsen-Anhalt, Germany
- ◆ Zentrale Polizeitechnische Dienste, Germany
- ◆ Bundesamt für Verfassungsschutz, Germany
- ◆ BEV (Bundesamt für Eich- und Vermessungswesen)

### Research/Development, Science and Universities

- ◆ Deutsches Forschungszentrum für Künstliche Intelligenz, Germany
- ◆ University Freiburg, Germany
- ◆ Indonesien Institute of Science, Indonesia
- ◆ Max-Planck-Institut für Polymerforschung, Germany
- ◆ Los Alamos National Laboratory, USA
- ◆ University of Bahrain, Bahrain
- ◆ University of Florida, USA
- ◆ University Erlangen, Germany
- ◆ University Hannover, Germany
- ◆ University of Newcastle, United Kingdom
- ◆ University Strasbourg, France
- ◆ Universität Frankfurt, Germany
- ◆ University Munich, Germany
- ◆ Technical University Hamburg, Germany
- ◆ Max-Planck Institut für Radioastronomie, Germany
- ◆ Max-Planck-Institut für Quantenoptik, Germany
- ◆ Max-Planck-Institut für Kernphysik, Germany
- ◆ Max-Planck-Institut für Eisenforschung, Germany
- ◆ Forschungszentrum Karlsruhe, Germany

### Industry

- ◆ Shell Oil Company, USA
- ◆ ATI, USA
- ◆ Fedex, USA
- ◆ Walt Disney, Kalifornien, USA
- ◆ Agilent Technologies Co. Ltd., China
- ◆ Motorola, Brazil
- ◆ IBM, Switzerland
- ◆ Audi AG, Germany
- ◆ BMW, Germany
- ◆ Daimler Chrysler AG, Germany
- ◆ BASF, Germany
- ◆ Deutsche Bahn, Germany
- ◆ Deutsche Telekom, Germany
- ◆ Siemens AG, Germany
- ◆ Rohde & Schwarz, Germany
- ◆ Infineon, Austria
- ◆ Philips Technologie GmbH, Germany
- ◆ ThyssenKrupp, Germany
- ◆ EnBW, Germany
- ◆ RTL Television, Germany
- ◆ Pro Sieben – SAT 1, Germany
- ◆ Channel 6, United Kingdom
- ◆ WDR, Germany
- ◆ NDR, Germany
- ◆ SWR, Germany
- ◆ Bayerischer Rundfunk, Germany
- ◆ Carl-Zeiss-Jena GmbH, Germany
- ◆ Anritsu GmbH, Germany
- ◆ Hewlett Packard, Germany
- ◆ Robert Bosch GmbH, Germany
- ◆ Mercedes Benz, Austria
- ◆ EnBW Kernkraftwerk GmbH, Germany
- ◆ AMD, Germany
- ◆ Infineon Technologies, Germany
- ◆ Intel GmbH, Germany
- ◆ Philips Semiconductors, Germany
- ◆ Hyundai Europe, Germany
- ◆ Saarschmiede GmbH, Germany
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