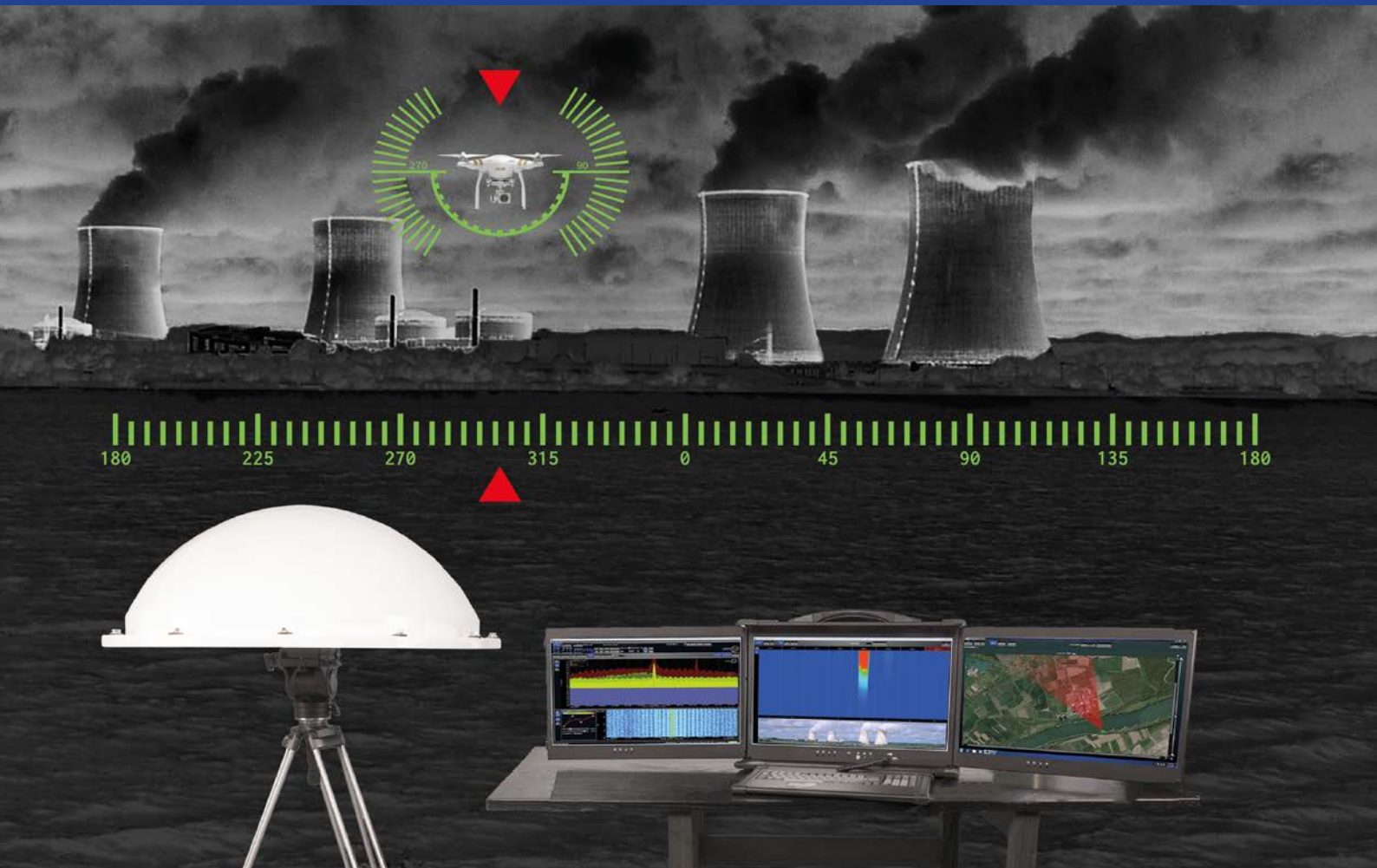# Real-Time RF Drone and Radar Detection System
Aaronia Drone Detector

Captures any kind of UAV / Real-time remote controllable / All-in-one solution

Extremely high coverage of several km

Locates the drone and the drone operator

360° coverage with high tracking accuracy

AARONIA AG
WWW.AARONIA.DE

Highlights

✔ Real-time measurement of the RF emissions from drones / UAVs, radar etc.

✔ Tracks the operator controlling the drone too

✔ Extremely high coverage, several kilometers depending on the drone type

✔ Works with unlimited number of drones at the same time

✔ Identification of the drone type (e.g. DJI Phantom 4)

✔ Works at night, fog and bad weather

✔ Also works against drones "disguised" between buildings, plants, trees

✔ Allows for 24/7 recording and monitoring without any gaps

✔ High tracking accuracy of up to 2°

✔ Ready for use within a minute (portable version)

✔ 360° coverage

✔ Covers a freqency range from 9kHz to 20GHz

✔ Unlimited in size & numbers of receivers, arbitrary scalable and expandable

✔ High sensitivity even in urban environment, due to switchable sectro-amps

✔ Made in Germany

MADE IN GERMANY

Aaronia Drone Detector

Anti-UAV System to monitor, detect and defeat unwanted Drones

After 4 years of development, Aaronia introduces its new Drone Detection System. The Aaronia Drone Detector is used to detect the incursion of unwanted drones, based on the directional real-time measurement of the electromagnetic emissions of the drone and its remote control. It warns the operator when drones are in the area and send alerts.

Drones can be more than just an annoyance

The rapid proliferation of micro/mini UAVs is a growing potential threat to national and commercial security. Easy to produce, cheap to buy, simple to fly, and hard to detect, commercially and non-commercially available drones are one of the most quickly evolving technological threats to military and civilian interests. A commercial drone reportedly alarmed the Secret Service in March 2015 when the aircraft flew too close to President Barack Obama during a round of golf in Florida.

Aaronia Drone Detector can be used anywhere

The drone detection system can be used virtually anywhere. Typical use scenarios are the protection of residential areas, governmental buildings and commercial / industrial areas like nuclear plants. Available as single-side or multiple-side solution, the system is adjustable to the characteristics of the terrain to be monitored.

Hardware

The drone detector is based on the Aaronia Iso-LOG 3D antenna, a real-time Spectrum Analyzer (XFR V5 PRO, ODB or RF Command Center) and a special software plugin for the RTSA Suite software. All parts combined allow a 24/7 monitoring and recording with a gapless data-streaming. The system saves considerable measurement time and is compact and flexible. It can be set up at any place you need to control.

Detection Range

The system has no limitation in detection range, usually the detection range is the same as the usable distance from the operator to the drone (or better), so it always depends on the transmitter power of the drone/operator. Depending on the drone type, it could be several km / miles without problems.
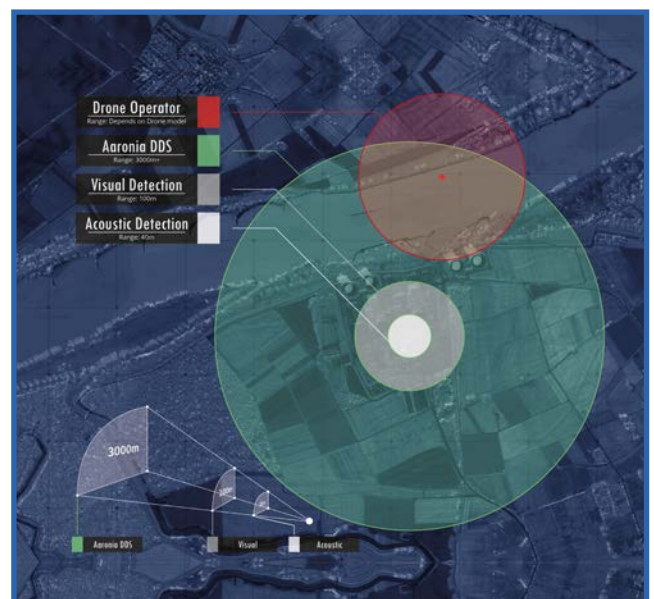
Early detection

The Aaronia Drone Detector already gives an alarm as soon as a remote control is on air, so even before the drone is in the air. Countermeasures can therefore be initiated at an early stage.

Typical Detection Range of the Aaronia DDS

Counter-Measures

The system can be extended by a jammer that can effectively prevent rf contact to a drone to force it into the fail-safe mode, e.g. to land or to hover. The interference is extremely selective, that other rf channels are not impaired.

Besides the selectivity the jammer is highly directional and only jams in the direction of the incoming UAV.

Advantages of a radio communication solution

The RF detection of the drone signals has minor advantages compared to other methods such as radar, optical and acoustic detection:

- **Safe detection without false alarms**
  The system can not be irritated by other flying objects such as birds, balloons or dragons.

- **Early detection**
  The Aaronia DDS already gives an alarm as soon as a remote control is turned on, so even before the drone is in the air. Countermeasures can therefore be initiated at an early stage.

- **Tracking the drone owner**
  Since the Aaronia Drone Detector detects both the drone via its downlink signals as well as the remote control, the direction of both can be tracked immediately. When 3 or more systems are used, the exact position can be determined via triangulation.

Made in Germany

The Aaronia Drone Detector is developed, individually manufactured and calibrated in Germany. This guarantees highest standards.
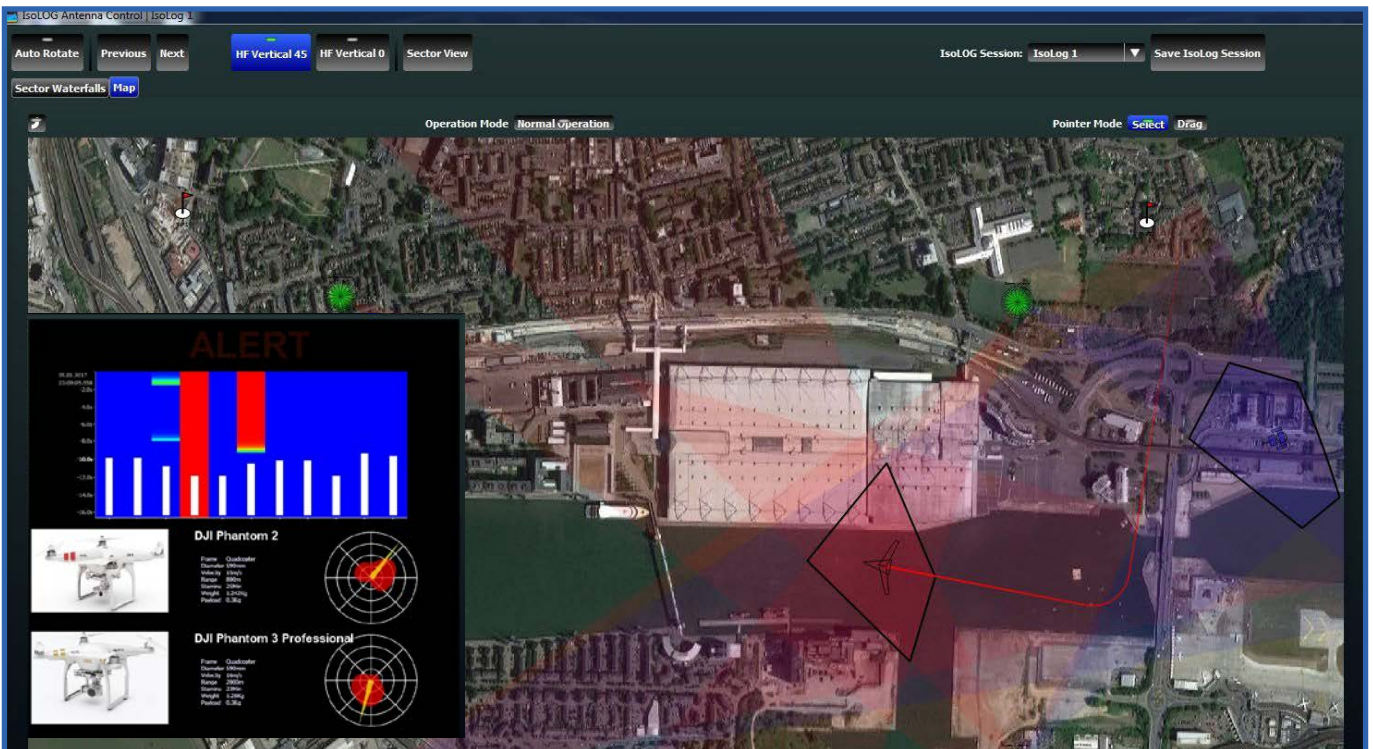

This picture shows the map view of the Aaronia DDS, with direction and position of the drone (red) and the operator (blue). The DDS shows even the type of detected drone and can handle an unlimited number of drones simultaneously.
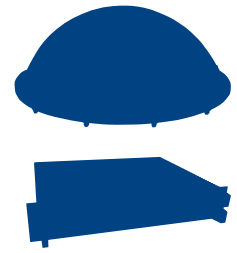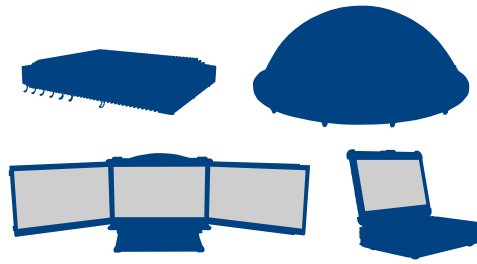
Single Site / Portable Solution
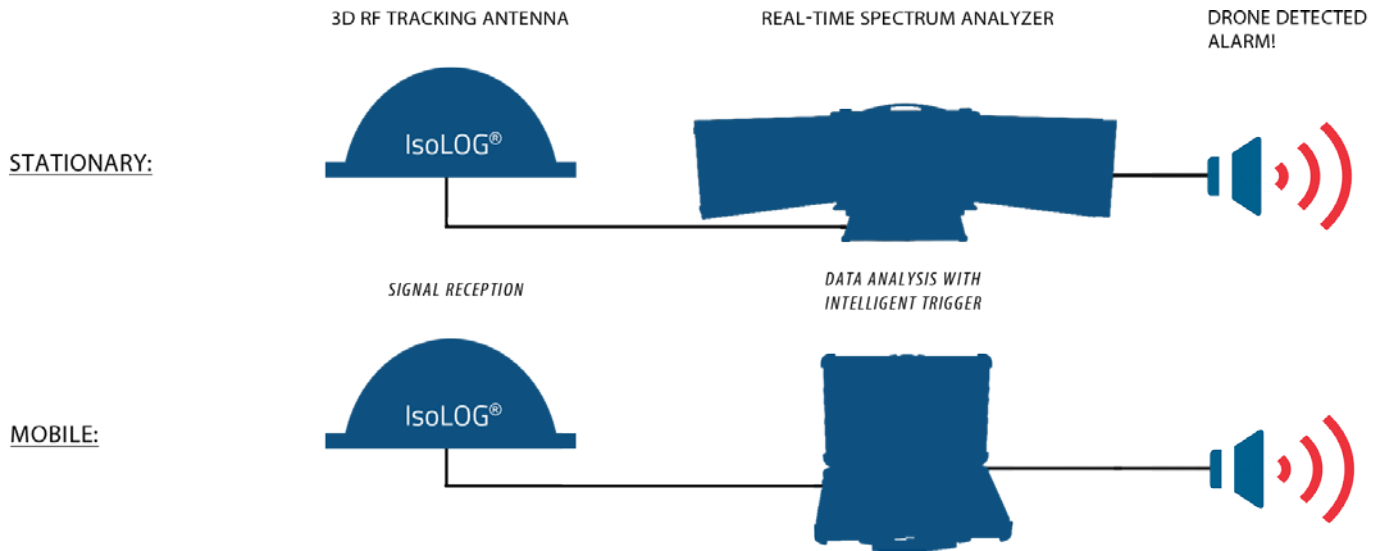
The single side solution is ready to use within a few minutes only. Based on a stationary or mobile Spectrum Analyzer (RF Command Center or XFR V5 PRO, see page 6) and the 3D direction finding antenna IsoLOG 3D, this solution is the first choice for surveillance of smaller areas, e.g. a house or a prison.

Multi-Site Solution
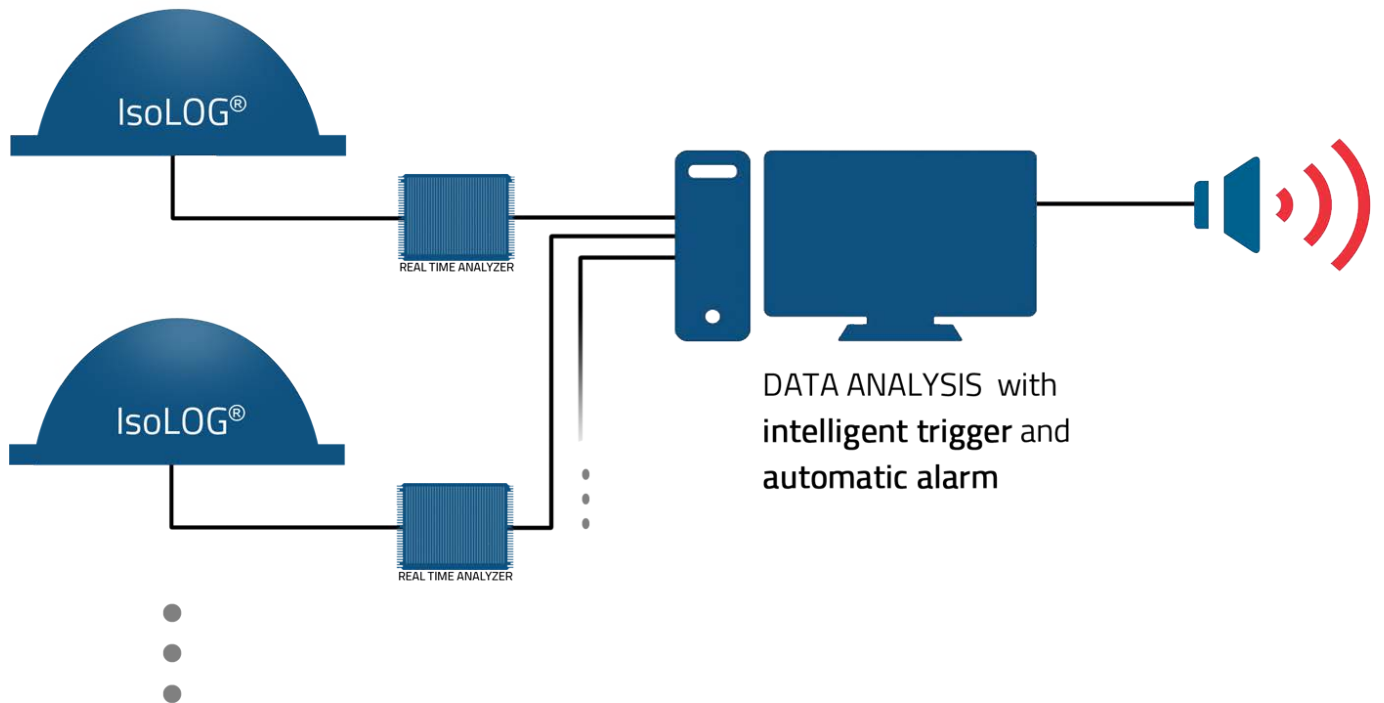
The multi solution consists of several antennas (IsoLOG 3D) and analyzers (Spectran V5 ODB - Outdoor analyzer), coupled together to one centralized monitoring PC which manages all systems simultaneously. The advantage of the multi solution is the possibility to triangulate the signals. This leads to a very high tracking accuracy. Furthermore, the multi solution can combine an unlimited number of receivers, thus it´s suitable to protect very large areas e.g. industry plants, stadiums, government buildings etc.

System Versions

	X3	X5	X7	X9
Range	500m - 1km	1km - 2km	2km - 5km	3km - 7km
Sectors	Omnidirectional	8	16	16
Tracking Accuracy (Line of Sight)	Omnidirectional	4 - 6°	2 - 3°	2 - 3°
Amps	1	2	2	2
Simultaneous Band Coverage	Hopping	Hopping	Hopping	Real-Time
Included Equipment	Android Watch, Backpack System	Command Center / XFR Pro /ODB, IsoLOG 3D	Command Center / XFR Pro /ODB, IsoLOG 3D	UWB, IsoLOG 3D
Scalable	No	Yes	Yes	Yes
Jammer Option	Gun	Gun or Array	Gun or Array	Gun or Array

X3 (Manpack - IN DEVELOPMENT)

Designed to be used as a concealed and portable drone and jammer detection device, the setup is lightweight and comfortable for the carrier and offers a long battery life.

X5 (Base)

The system consists of an analyzer (Command Center, XFR Pro or ODB) and an IsoLOG 3D antenna-array with 8 sectors. It can be used as a very cost-effective method to cover large areas with drone detection systems.

X7 (Advanced)

The highest precision in drone detection, combined with a very high detection range. Perfect for both single-system and multi-grid-system setups. It consists of a 16 sector IsoLOG 3D antenna-array and a spectrum analyzer (Command Center, XFR Pro or ODB).

X9 (Ultra Wideband - IN DEVELOPMENT)

The X9 combines the highest precision and range and adds ultra wideband monitoring for instant, real-time detection on multiple bands (instead of one instant or multiple via hopping). Consists of an IsoLOG 3D antenna-array with 16 sectors and the UWB unit.

Analyzer Versions

Portable Analyzer

The SPECTRAN V5 XFR Pro is the right choice if a portable system is required. A rugged, military grade Laptop, with a powerful i7 processor and an integrated spectrum analyzer.

Perfect for rapid deployment in the field - set up the IsoLOG 3D antenna, connect it to the XFR Pro and you are ready to detect drones.

Stationary Analyzer

The SPECTRAN V5 Command Center is built with the newest and most powerful hardware available (or with different specs per request). Three Full-HD monitors offer enough space to display all the information the RTSA Suite Software can show at the same time.

The hardware and large displays make the Command Center an excellent choice for stationary systems.

Grid / Outdoor Stationary Analyzer

The SPECTRAN V5 ODB is designed to be used as either an outdoor analyzer for remote detection or as a part of an antenna-analyzer grid, allowing the coverage of large areas and the triangualtion of drones and their operators.

It is water- and dustproof, remote controllable and requires almost no maintanance.

Ultra Wideband Analyzer

The UWB Recorder is our analyzer-array. It makes the monitoring of multiple bands in real-time (without hopping) possible.

Available as a PC-System, 19" Version or Server-Rack, with a real-time bandwidth of up to 20GHz. It can be used for stationary or grid systems and is the choice for no-compromise system setups.

Antenna Versions

IsoLOG 3D 80

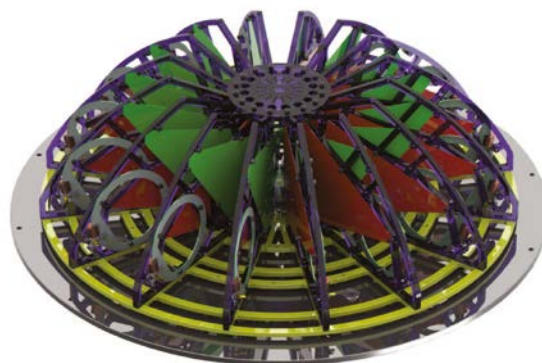**8 sectors with 16 antennas**
Frequency range: 680MHz (9kHz) to **6 GHz**
Tracking accuracy (line of sight): **4 to 6°**

Frequency range	
Standard	680MHz to 6GHz
VLF Extender to 9kHz (option)	Yes
SHF Extender to 20GHz (option)	Yes

Additional Options	
Internal GPS receiver	Yes
Internal low-noise pre-amplifier	Yes (included)
Customized color (RAL table)	Yes (standard - white)
8x horizontal LPDA's in addition	Yes

Mechanical/Environmental	
Power	Yes
Operating temperature	-30 to +60°C (-22 to 140° F)
Storage temperature	-40 to 70°C (-40 to 158°F)
Dimensions	950 x 950 x 300mm
Weight	approx. 20kg
RF Output	N (50 Ohm)
Warranty	2 years

IsoLOG 3D 160

16 sectors with 32 antennas
Frequency range: 680MHz (9kHz) to **6 GHz**
Tracking accuracy (line of sight): **1 to 3°**

Frequency range	
Standard	680MHz to 6GHz
VLF Extender to 9kHz (option)	Yes
SHF Extender to 20GHz (option)	Yes

Additional Options	
Internal GPS receiver	Yes
Internal low-noise pre-amplifier	Yes (included)
Customized color (RAL table)	Yes (standard - white)
8x horizontal LPDA's in addition	Yes

Mechanical/Environmental	
Power	Yes
Operating temperature	-30 to +60°C (-22 to 140° F)
Storage temperature	-40 to 70°C (-40 to 158°F)
Dimensions	950 x 950 x 300mm
Weight	approx. 20kg
RF Output	N (50 Ohm)
Warranty	2 years

References

Cross-Section of Aaronia Clients

Government, Military, Aeronautic, Astronautic

- NATO, Belgium
- Department of Defense, USA
- Department of Defense, Australia
- Airbus, Germany
- Boeing, USA
- Bundeswehr, Germany
- NASA, USA
- Lockheed Martin, USA
- Lufthansa, Germany
- DLR,Germany
- Eurocontrol, Belgium
- EADS, Germany
- DEA, USA
- FBI, USA
- BKA, Germany
- Federal Police, Germany
- Ministry of Defense, Netherlands

Research/Development, Science and Universities

- MIT - Physics Department, USA
- California State University, USA
- Indonesien Institute of Sience, Indonesia
- Los Alamos National Labratory, USA
- University of Bahrain, Bahrain
- University of Florida, USA
- University of Victoria, Canada
- University of Newcastle, United Kingdom
- University of Durham, United Kingdom
- University Strasbourg, France
- University of Sydney, Australia
- University of Athen, Greece
- University of Munich, Germany
- Technical University of Hamburg, Germany
- Max-Planck Inst. for Radio Astronomy, Germany
- Max-Planck-Inst. for Nuclear Physics, Germany
- Research Centre Karlsruhe, Germany

Industry

- APPLE, USA
- IBM, Switzerland
- Intel, Germany
- Shell Oil Company, USA
- ATI, USA
- Microsoft, USA
- Motorola, Brazil
- Audi, Germany
- BMW, Germany
- Daimler, Germany
- Volkswagen, Germany
- BASF, Germany
- Siemens AG, Germany
- Rohde & Schwarz, Germany
- Infineon, Austria
- Philips, Germany
- ThyssenKrupp, Germany
- EnBW, Germany
- CNN, USA
- Duracell, USA
- German Telekom, Germany
- Bank of Canada, Canada
- NBC News, USA
- Sony, Germany
- Anritsu, Germany
- Hewlett Packard, Germany
- Robert Bosch, Germany
- Mercedes Benz, Austria
- Osram, Germany
- DEKRA, Germany
- AMD, Germany
- Keysight, China
- Infineon Technologies, Germany
- Philips Semiconductors, Germany
- Hyundai Europe, Germany
- VIAVI, Korea
- Wilkinson Sword, Germany
- IBM Deutschland, Germany
- Nokia-Siemens Networks, Germany

MADE IN GERMANY