

# F.A.Q. SHEET - AARTOS

# DRONE DETECTION

## SYSTEM



All-in-one solution, NO additional hardware or software required

Enables multi-system setup for surveillance of large areas

Real-time remote-controllable via Ethernet / LAN / 3G / 4G

24/7 gapless and unlimited recording

Customizable smart alarm

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MADE IN GERMANY

# 1. PERFORMANCE

## What is the system's detection range?

The AARTOS Drone Detection system features a virtually unlimited detection range. Usually, the detection range is equal to (or better than) the maximum distance between the operator and the drone, thus depending on the transmitter power of the drone and / or its operator. Taking into account various factors such as drone type and topography, then, this range can be up to 50 km or more (e.g. the typical detection range for a DJI Phantom 4 drone is around 5 km).

## How quickly can a drone be detected?

Detecting a drone may take the system between 10 µs to 500 ms, depending on several factors such as the complexity of the particular AARTOS system in use, the number of IsoLOG 3D antenna arrays etc.

In general, drones can be detected as soon as the radio link is established (i.e. both the drone and the remote control are switched on). The pairing, establishing of the radio-link, take-off, and climb usually take between 30 seconds and five minutes, depending on the drone model (our reference being the DJI Mavic PRO). This can take significantly longer, however, should the operator choose to perform a full system check.

Optical, acoustic and radar-based drone detection solutions are not able to perform this kind of early-warning detection.

## Can the AARTOS DDS detect the drone operator?

Certainly, the AARTOS DDS detects and tracks the drone operator's movements as well.

## Can the system detect the drone altitude as well?

Absolutely, when using two or more systems, the DDS detects the altitude as well. Single systems only show the azimuth.

## Is it possible to measure the distance to the drone?

Yes, and you will only need two systems for accurately measuring the distance (most other drone detection systems require at least three). For best results, however, we recommend using three systems.

## Can the system detect several drones at once?

Yes, the system can detect multiple drones or drone swarms at once, regardless of brand, type or even direction.

## What are the detection mechanisms?

The AARTOS DDS uses real-time RF signal detection and a combination of smart pattern triggering and neural network scanning.

## What kind of coverage does the system provide?

The system's IsoLOG 3D antenna covers 360°. It can also be adjusted to specific needs, that is e.g. mere 90° or 180° (edge-) coverage.

## Does the AARTOS DDS depend on a line of sight?

Accurate detection is certainly best within line of sight, but the system is by no means limited to that. The AARTOS DDS relies on RF signals, and the nature of RF signals is that they can be traced regardless of obstructions – that means, whether they originate behind buildings or trees, in woods or a crowd of people, they can be detected and traced. In other words: If the signal is strong enough, the system's detection range is virtually unlimited.

## Are there limitations to the detection and tracking altitude and / or elevation with respect to the sensor(s)?

Since the system can be equipped with an unlimited number of sensors, forming a network of multiple sensors covering larger areas, there are no limitations in terms of altitude and elevation. All systems can be linked to a single monitoring center, offering remote-control capabilities to each system. Each single system covers a radius of 360°, including the airspace above the sensor (i.e. 360° dome coverage).

## If a drone's frequency range is unknown – how does the AARTOS DDS detect it?

The AARTOS X3, X5, and X7 systems offer an extremely fast scan-and-hop mode that works in two distinct ways: It can either hop between all "typical" drone frequency ranges (e.g. 433 MHz / 915 MHz / 2.4 GHz / 4.3 GHz / 5.8 GHz) or it can sweep a complete frequency range (e.g. 100 MHz to 6 GHz). In addition, the AARTOS X9 system offers an ultra-wideband solution, covering all "typical" drone frequency ranges in real-time without hopping.



Super-quick mobile AARTOS DDS setup.

## Does the AARTOS DDS support 24/7 surveillance?

Yes, the AARTOS DDS can be switched to a 24/7 recording mode, i.e. as long as the internal / external memory (HDD / SSD) offers enough space, the system can monitor and record the entire real-time spectrum without gaps. In the context of a criminal prosecution, then, this information may also be used as valuable evidence.

## Can the AARTOS DDS be switched to an event-recording mode?

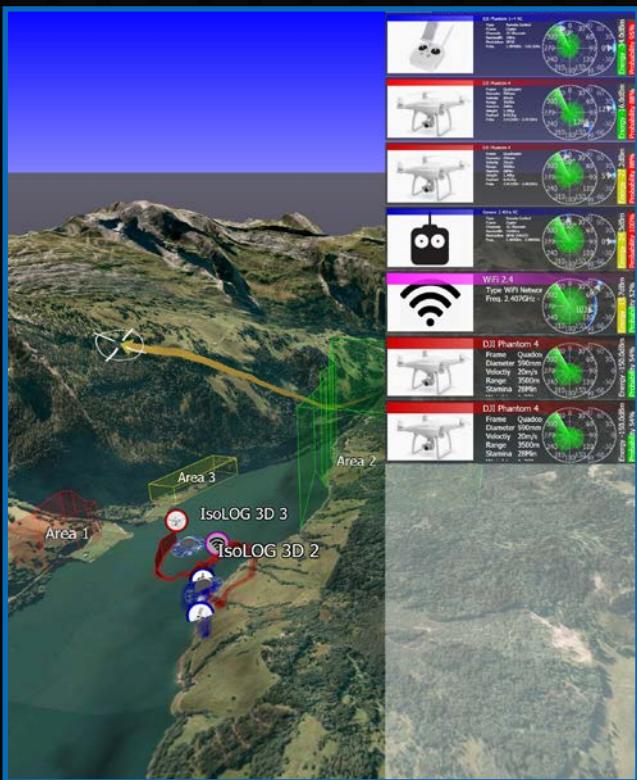
Yes, the AARTOS DDS can be switched to what we call the SmartEvent recording mode. By filtering and deleting useless data, plenty of recording space can be made available on the internal / external memory (HDD / SSD).

## Does the AARTOS DDS emit any radiation? Could it be operated e.g. at or near airports without interference?

The AARTOS DDS is an entirely passive system, therefore not emitting any radiation at all. It could thus easily be operated in such contexts without interference whatsoever.

## Can the AARTOS DDS be disguised or camouflaged?

Yes, very easily so. The antenna can be covered with any material, e.g. camouflage netting, as long as it is RF non-reflective (i.e. non-metallic) – yet another advantage of the AARTOS DDS system over optical, acoustic and radar-based drone detection systems. Mounted on a vehicle, the AARTOS DDS can hardly be distinguished from a common TV or satellite antenna.



*The impressive 3D GUI of the AARTOS DDS.*

## Could the performance of the AARTOS DDS be negatively affected by other RF radiation (urban environment, WiFi, Bluetooth, etc.)?

No, additional RF radiation does not influence the system at all.

## Does the AARTOS DDS work at night?

Yes, the AARTOS DDS works around the clock, day and night. The availability of daylight is not a limiting factor to the system.

## Is the performance of the AARTOS DDS limited to certain weather conditions?

No, the AARTOS DDS is entirely weather-proof and hence impervious to fog, rain, snow etc. It was designed and tested to be operated under the most adverse conditions.



*The AARTOS DDS Container deployed in the Swiss Alps. Self-sustaining for up to 3 months.*

## 2. TRIGGER AND IDENTIFICATION

### Can the AARTOS DDS distinguish a common drone signal from WiFi or other RF signals?

Yes, our system uses intelligent pattern classification, enabling it to distinguish precisely between those signals.

### How does the AARTOS DDS distinguish between different drone models or signals?

We use a sophisticated method of recording drone emission patterns. These patterns are saved in our so-called Smart Trigger Pattern Database (or STPD), a database that is constantly being maintained and expanded (optional upgrades are available online via the Aaronia homepage). For professional use, users can also add custom pattern recordings to their database through the system's teach-in function.

### Is it possible to prevent friendly drones from triggering the alarm?

Yes, the system is adaptable: You can use the teach-in function mentioned above to teach the AARTOS DDS which drones are friendly. Once recorded, the system is able to distinguish friendly drones from actual threat.



Stationary and vehicle-mounted versions.

### Could commercial planes, birds or other airborne objects cause the system to trigger a false alarm?

Absolutely not. The AARTOS DDS is designed to distinguish on a sophisticated level between all such objects, thus eliminating the likelihood of false alarms.

### When the AARTOS DDS detects a drone and triggers an alarm, can it provide any information on the location of the drone or the operator? How accurate is the information?

In general, the AARTOS DDS detects both the drone and its operator. The amount and accuracy of the information, however, depends on the number of systems and antennas in use. A single AARTOS DDS can provide the direction from where the signal originates. The accuracy depends on the type of IsoLOG used, but offering up to 22.5° sector accuracy in any case with the standard IsoLOG 3D 160 antenna. Real-life accuracy, however, is much higher as the software can easily interpolate between sectors.

The number of IsoLOG antennas also determines the level of accuracy – once several antennas are being operated, signal triangulation enables users to locate the exact position (and not only the direction) of the drone and / or its operator.

### Can the system detect several drones at once?

Yes, the system can detect multiple drones or drone swarms at once, regardless of brand, type or even direction.

### 3. COUNTERMEASURE SOLUTIONS

#### Do you have any products that can prevent a drone from entering a facility's airspace?

Yes, we offer various so-called countermeasure solutions (CMS), Jammers to "keep the drone out", as it were: Available are both stationary and mobile solutions, such as our backpack jamming system and Sector Jammers.

#### Are the countermeasure solutions integrated into the main system?

Yes, the stationary CMS are integrated seamlessly into the AARTOS DDS system.

The mobile backpack CMS is entirely manual, however, and thus not available as an integrated solution.

#### Is an operator required for the stationary CMS?

Once correctly set up, an operator is no longer needed. All our CMS can be controlled manually, or operated fully or semi-automatically – tailored specifically to the users' needs.

#### Once detected, how long does it take to disable a drone?

It takes approximately 2-3 seconds to block the control signal and video link once a drone has been detected. These figures apply to both the stationary and mobile CMS versions.

#### What shutdown range do the countermeasure solutions offer?

The stationary CMS has a range of up to 12 km (or 7.45 miles), depending on the specific model.

The mobile CMS has a shutdown range of 2.5 km (or 1.55 miles), while still blocking the systems of targets further away.



An AARTOS DDS range and field test at the beach.

# 4. INSTALLATION AND INFRASTRUCTURE

## Are there any infrastructure requirements for the AARTOS DDS?

Requirements depend on the system model: Our portable systems, for one, have independent battery power supply. Other systems at least need a power connection, while systems based on multiple remote units need Ethernet cable connections and a power supply.

Yet, we also offer a GSM-based version not requiring an Ethernet cable connection. Bear in mind, however, that an Internet connection may occasionally be needed in order to update the software or the STPD (Smart Trigger Pattern Database).

## Provided power, additional equipment and a crew are already on site – how long does the setup of a single system take?

Our mobile manpack version, the AARTOS DDS X3, is ready to use after barely 30 seconds.

The bigger systems – X5, X7, and X9 – require around 3 to 5 minutes for the complete setup of a single system by a trained crew of two people.

## How long are the expected downtimes of the AARTOS DDS?

Software upgrades (e.g. for the drone database, new software features, and device firmware) generally take around 10 to 20 minutes. No further required downtime known so far.

## Does the AARTOS DDS need to be always manned?

Not at all. Once the initial setup is completed, the system works fully automated.



Use of a mobile version of the AARTOS DDS in the field.

## Is it possible to implement the AARTOS DDS into existing surveillance systems?

Yes, the AARTOS DDS system includes an application programming interface (or API), allowing the user to implement it into any existing surveillance software or hardware systems.

## How long does it take to train a new system operator?

The necessary training to fully operate the AARTOS DDS can be obtained within a few days at our campus in Germany. Please contact [mail@aaronia.de](mailto:mail@aaronia.de) for further details on our trainings.

## At what height should the antennas be installed for best results?

The antenna should be installed at a minimum height of 3 m from the ground. The general rule of thumb is: The higher the antenna, the more refined its results.



## Can the AARTOS DDS be protected against lightning?

Yes, a standard lightning rod can be installed and does not influence the AARTOS DD system's performance.

## In terms of mobile use, is the AARTOS DDS limited to certain vehicles?

Not in the least. As far as mobile mounting goes, the AARTOS DDS is very flexible and durable: It can be installed on vehicles such as cars, trucks or vans, and even on boats – all parts of the IsoLOG 3D antenna are resistant to saltwater as well as weather- and splash-proof thanks to its IP65 certification. Coastal and marine environments therefore pose no limitation to the system's performance.

## Does the AARTOS DDS emit any radiation that may interfere with operations of e.g. a nearby airport?

No, the AARTOS DDS does not emit any radiation that could interfere with such operations. It is an entirely passive system.

## What is the usable temperature range?

The IsoLOG 3D antenna supports an operating temperature of -40° C to +80° C.

Our real-time spectrum analyzer (XFR V5 PRO) supports an operating temperature of -20° C to +60° C.



*Vehicle-mounted AARTOS DDS with extendable mast.*

# 5. SALES, SERVICE, DEMONSTRATIONS

## Who may need a drone detection system?

When it comes to drone detection, the term ‘target group’ becomes ambiguous – drones may pose a potential threat to commercial, public and private causes alike. Our drone detection system can hence be beneficial to a variety of customer groups: Companies from the automotive and chemicals industry, critical infrastructure such as nuclear power plants, correctional facilities, governments, but also operators of airports, stadiums, and concerts.

Military branches and security firms benefit from drone detection on a similar level, as do private individuals seeking to protect their homes and properties.

## Is the AARTOS DDS future-proof?

The AARTOS DDS is under continuous development and consistently kept up-to-date. In addition, we offer service-level agreements (SLAs) containing regular updates to and maintenance of the Smart Trigger Pattern Database, the DDS software, the firmware for our analyzers and even the hardware of the IsoLOG 3D antenna itself.

## How long will you keep the system in production and provide support for it?

For the AARTOS DDS system, we provide support for a minimum of 10 years.

## Where can I see the AARTOS DDS in action?

We demonstrate the AARTOS DDS at various international trade shows and conventions, and co-operate with partners around the globe. Should you have further queries regarding demonstrations, please contact us at [mail@aaronia.de](mailto:mail@aaronia.de).

## Where is the AARTOS DDS being manufactured?

The AARTOS Drone Detection System is developed and manufactured in Germany, thus adhering to the highest quality standards.

## What is the typical lead time?

The typical lead time for a single AARTOS DDS is around 2 - 4 weeks, depending on the complexity of the final configuration.

## What is the cost of the AARTOS DDS?

For all information related to the AARTOS DDS and its price range, please feel free to contact us at [mail@aaronia.de](mailto:mail@aaronia.de).

## Does the AARTOS DDS have any export regulations?

In most cases, the AARTOS DDS has no restrictions with regard to export or import.

For further clarification, please contact us at [mail@aaronia.de](mailto:mail@aaronia.de).



*The AARTOS DDS is vehicle-mountable.*



Drone Detection in every terrain with the Aaronia Unimog

## DRONE DETECTION SYSTEM

- Measures drone and UAV RF emissions
- Specialized drone detection software
- Ultra-high range of up to 50 km
- Works at night, in fog and bad weather
- Detects drones behind obstacles
- Extremely high tracking accuracy
- 360° coverage
- Made in Germany



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