

# DR 100 for C-UAS



KONGSBERG



## 3D Drone Detection Radar

The Kongsberg DR 100 is a purpose-built Drone (UAV) Detection Radar providing tracking and classification out of the radar panel. It is a small and low-weight, non-rotating, solid-state panel-based radar. The radar is made to recognize commercially available, low-cost and small UAVs (Unmanned Aerial Vehicle) that can easily be rebuilt to carry small payloads, potentially causing large damage. In recent years, smaller commercially available drones have been used in conflict areas as well as around public arrangements and critical infrastructure, both to support good and bad intentions. The Kongsberg DR 100 addresses both the security and defence market.

The opening angle is 90 - 100 degrees horizontally and approximately the half vertically. This gives the radar a large detection volume with a constant real-time picture based on the FMCW emission. The distributed network approach allows for building a flexible system of radars depending on threats and number of co-operating players, as the radar easily can be mounted on moving vehicles and provisional locations such as tripods etc. For point protection three to four panels can be mounted in the same location to provide a 360-degree coverage. In a perimeter protection setup the radars can be moved to the flanks to provide early and high accuracy (range and azimuth) target information that are sent over the network to available countermeasure system in the network.

### Classification

The state-of-the-art tracking and classification algorithms provide for an early classification and low alert/notification rate based on the built-in library. The radar differentiates between moving objects and can classify the objects whether it is a drone, bird, vehicle, person or boat etc. Within the opening angle the target classification probability is above 95 %. The system allows for in-the-field signature library updates assuring a highly flexible and future proof guidance system for effectors and cameras.

### Robustness

The robust mechanics and the design of the housing is based on Kongsberg's long experience in the maritime environment. No rotation and moving parts allow for low maintenance costs. Effective heat dissipation is achieved through the smart design and provides cooling without using fans. When mounted on vehicles an optional protection cover can be used in desert areas to avoid sand and dust from damaging the surface.

### Effector options

The DR 100 can be interfaced with both hard-kill and soft-kill effector options. The panel is specifically developed to be interfaced with a Remote Weapon System (RWS) to engage incoming UAVs on ranges up to 1000 meters. The DR 100 has been interfaced and tested with direct mount (bracket) on remote weapon stations.

### Networked radars for increased range and performance

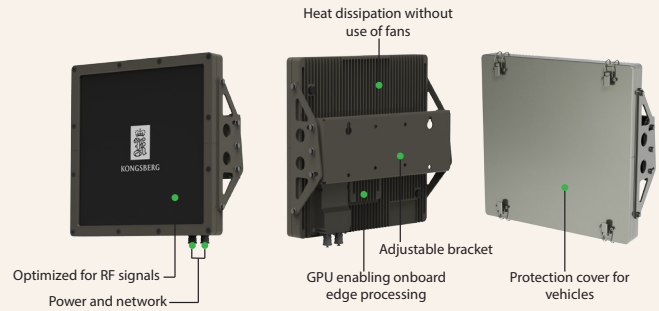
One of the benefits of the DR 100 is that it can be linked in an IP based network. In this case, the radars will have to be set up with a high-speed, low-latency communication link. Kongsberg can provide the Mobile Broadband Radio (MBR) for this purpose. However, any IP based communication link with sufficient bandwidth, range and low latency can be utilized. The purpose of using DR 100 in a networked configuration is to expand the range of the area where targets are detected. This allows for a setup of dynamic defense perimeters during combat missions to protect for instance Anti-Air missile systems, or as an on-the-move dynamic perimeter that will move with the assets involved. As an example, a forward patrol team with a DR 100 can give an early warning to a more defensive placed unit to expand the warning window and to prepare defensive measures. Kongsberg's Mobile Broadband Radio (MBR) is a suitable phased array communication link with high bandwidth, low latency and long range that is specifically developed for dynamic scenarios.

### Mounting options

The radar can be mounted both on fixed installations and on moving platforms. The radar is light-weight and can be mounted on a tripod or similar by one person. It is developed to be mounted on a vehicle or vessel to provide on-the-move CUAS capability. A mast based solution with one or up to four panels can be delivered to provide perimeter or point protection of critical infrastructure.

## FEATURES

- Specifically designed for detection, tracking and classification of small UAVs (Unmanned Aerial Vehicle)
- High update rate and low latency
- Individual tracking of drones in a swarm
- Networking of radars
- Small target detection
- All processing onboard the panel
- Target data over LAN on various protocols
- Interface towards Kongsberg Situational Awareness solution (ProximityView)
- Optionally; Broadband communication solutions optimized for real-time systems such as a distributed radar system
- Available in standard colours green or grey



## Technical specifications

### DR 100 for C-UAS

Technology	FMCW/doppler/micro doppler
Frequency	9.45- 9.55 GHz (X-band)
Accuracy range	< 0.5 m
Accuracy azimuth	< 0.5°
Accuracy elevation	< 1.0
Update rate	5 -10 Hz
Latency	< 200ms
No. of simultaneous targets	> 100
Time to classification	0.5 - 5 sec
Target speed	> 70 m/s, max.
Data protocol	Native (proprietary), Asterix, Sapient (under implementation)
Instrumented range	4.3 km

### Interfaces

Ethernet/LAN	1 Gb (Amphenol 38999/mil connector)
--------------	-------------------------------------

### Performance range

90 degrees horizontally, 50 degrees vertically

NATO type	RCS	Tracking range	Classification range
Class 1a Nano	0.001 m <sup>2</sup>	0.6 km	0.45 km
Class 1b Micro	0.005 m <sup>2</sup>	1 km	0.7 km
Class 1c Mini	0.1 m <sup>2</sup>	1.5 km	1 km
Class 1d Small	0.5 m <sup>2</sup>	2 km	1.4 km
Class 2 Tactical	1 m <sup>2</sup>	2.6 km	1.75 km
Class 3 Strike	20 m <sup>2</sup>	4.3 km	3.3 km

### IMU sensor during on-the-move

Supported IMU/gyro	MRU 5+, MGC R2, MGC R3 (See dedicated datasheets for technical information) Non-Kongsberg IMU supported upon request
--------------------	--

### Weight and dimensions

Dimensions	400 × 400 mm
Weight incl. bracket	9.9 kg

### Power specifications

Supply voltage	18 - 34 VDC
Power consumption	60 W standard, 100 W max.
Connector	Amphenol 38999

### Environmental specifications

Operating temperature	-25 - +55 °C
Storage temperature	-40 - +70 °C
Operating humidity	100 %
Storage humidity	60 %, max.
Ingress protection	IP67
Safety distance	0.5 m

### Standards and regulations

EMC	IEC 60945/EN 60945 MIL-STD-461 (where relevant)
Product safety	IEC 61010-1/EN 61010-1 IEC 62368-1 (pending)
Environmental	IEC 60945/MIL STD 810H (random vibration)
Spectrum	ETSI EN 303 413 V1.2.1 (2021-04) ETSI EN 300 330 V2.1.1 (2017-02)
Maritime Power surge	IEC 60945 MIL STD 1275E



Quad DR 100 with PTZ camera for 360° coverage

Specifications subject to change without any further notice.