

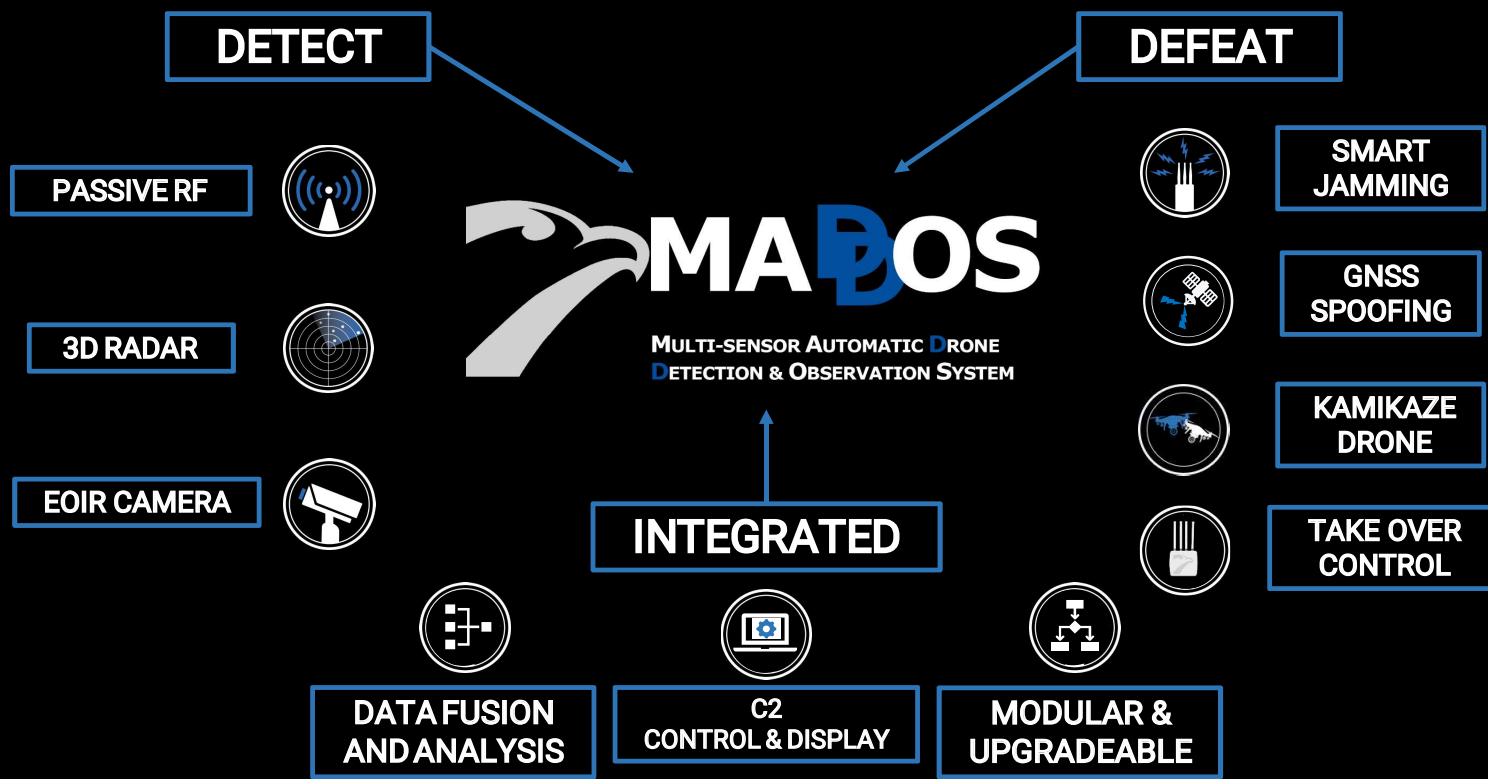
MADOS



- ✓ **New!** C2 software based on NATO standard symbology
- ✓ **New!** Hardkill solution – Kamikaze drones
- ✓ **New!** Take over control system for commercial drones
- ✓ **New!** Fully programmable jammer
- ✓ Realtime ALL frequency monitoring (NO bands), detects any drone at any frequency (20MHz – 18GHz)!
- ✓ Extremely high detection range
- ✓ 360A/90E degree full dome coverage with high tracking accuracy
- ✓ Scalable for huge sites and borders
- ✓ All-in-one solution, multi-sensor support, latest AI based software
- ✓ Locates drone swarms and drone operators

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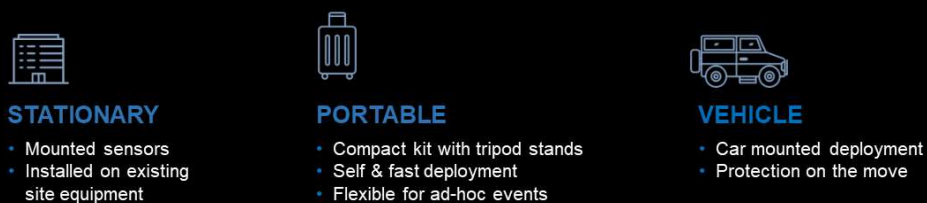




APPLICATION



SYSTEM CONFIGURATION



OPERATION SCHEME

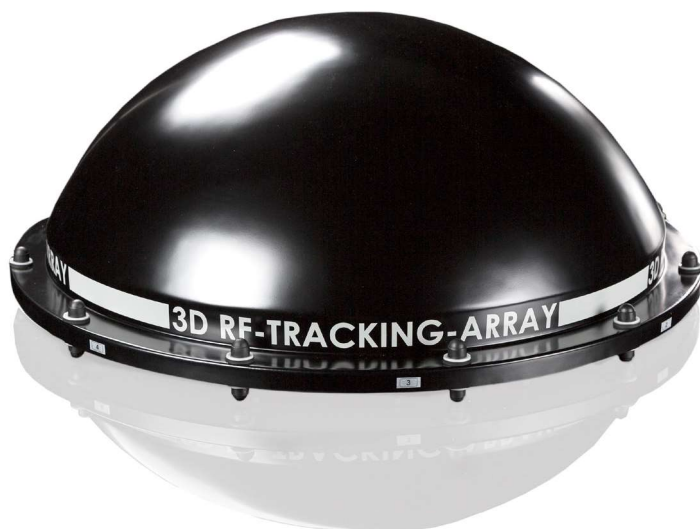


MADDOS RF

A radio frequency (RF) detector is a device used to detect the presence of RF waves in physical transmission medium. The MADDOS RF is able to detect drone and drone pilot. Thanks to advanced AI algorithms the system identifies the type of threat by comparing different frequency patterns. The system recognizes every radio signal and can easily distinguish drones from e.g. WLAN signals by learned patterns.

Main features

- ✓ Unique technology: Real-time ALL frequency monitoring (NO bands)
- ✓ Real-time DF frequency monitoring for all frequencies and directions at the same time
- ✓ Up to 48THz/s sweep speed
- ✓ Detects 3G, 4G and 5G drones
- ✓ Latest AI based multi-target image and RF pattern recognition
- ✓ Ultra-wide frequency range (20MHz to 18GHz)
- ✓ Multi-frequency, multi-directional swarm attack detection
- ✓ 360° azimuth and full 90° elevation gap-less full-dome coverage with high tracking accuracy
- ✓ Provides real-time measuring of the RF emissions from drones/UAVs, jammers, phones etc.
- ✓ Tracks and locates the operator(s) controlling the drone(s)
- ✓ Enables 24/7 seamless recording (tracking and/or raw data) and monitoring
- ✓ DF measurement accuracy up to ITU class A (up to 1° tracking accuracy incl. elevation)
- ✓ Scalable for huge sites (airports, cities, borders, even complete countrywide installations)
- ✓ Tested and running under the most adverse weather conditions (night, fog, rain etc.)
- ✓ Enhanced temperature range (desert installations)
- ✓ Setup and ready to use within a minute (portable version)

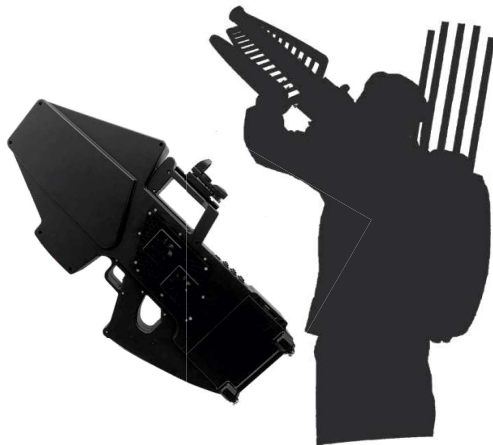


MADDOS Jammer

The system can be extended to include an automated, integrated jammer that can effectively prevent a drone from receiving RF contact/signals, thus forcing it into failsafe mode, e.g. to land or to hover. The interference is extremely selective so that other RF channels are not impaired.

Besides being highly selective, the jammer is extremely directional and only jams in the direction of the incoming UAV.

Mobile Handheld or Manpack-Jammer



Omni- and Directional Antenna,
Covers a total of 6 bands,
120 W output
(up to 2,5 km range)

Automatic Corner-Jammer

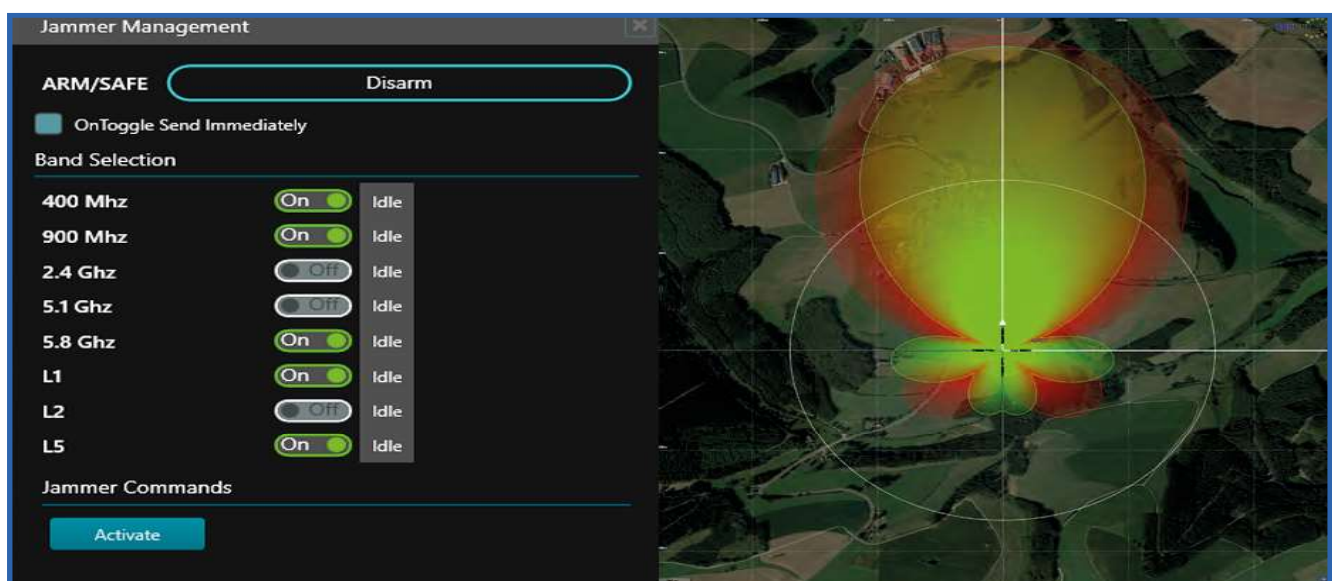


Configurable no. of 90° sectors,
Covers up to 15 bands,
425 W (up to 6 km range) or
1500 W output (up to 12 km range)

Programmable Omni-Jammer (360°)



360° coverage with 4 or 8 sectors,
Jamming frequency range:
400MHz – 6GHz (NO GAPS!),
30 W per sector (up to 4 km range) or
100 W per sector (up to 8 km range)



Powerful jammer setup tool: Sectors, omni and even complex beamforming shapes can be constructed or imported. This enables the user to see the coverage of every jammer and frequency on the GIS display.

MADDOS Camera

Additional protection through visual detection (optional)



Among the latest additions to the MADDOS DDS is the optional Visual Detection System - a fully integrated optical and thermal drone detection solution, perfectly matched with the detection mechanisms of the MADDOS Drone Detection System.

This option enables the user to actually spot detected drones, even from a long distance, and identify potentially dangerous payloads attached to the drone, such as explosives.

Should a drone switch to autonomous flying mode whilst being tracked by our Visual Detection System then the tracking will continue regardless.

Long range EOIR camera (3km +)	
Camera resolution	1920 x 1080
Continuous zoom optical	x60
Uncooled thermal camera resolution	640 x 512
Continuous zoom optical	x10
Size and weight	649.2 x 438 x 261.3 mm & 60 kg
Pan & Tilt range	Continuous 360° & -45° - +45°
Temperature range	-40°C - 60°C
Slew to curve mode	
Remote control software video tracking	



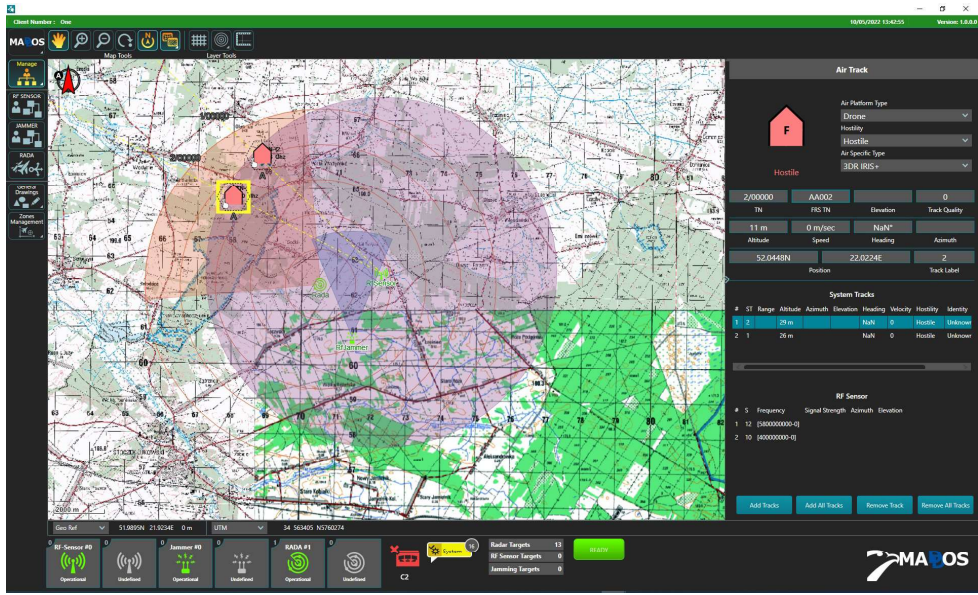
Ultra long range HD Thermal Camera (up to 7km)

Visual Example					
Drone // Distance	500 m	1000 m	1500 m	2000 m	2500 m
Phantom 4 (White Hot Filter)					
Phantom 4 (Black Hot Filter)					
Mavic (White Hot Filter)					
Mavic (Black Hot Filter)					



Full HD camera view and thermal camera view in the C2 software

S-Band Radar



MADDOS supports powerful 3D radar integration



MHR Radar

Key features

- Pulse-Doppler, AESA based on GAN amplifiers
- Non rotating, solid state, digital radar
- Multi Mission Radar platforms – can host varied operational missions simultaneously
- Software-Defined Radars, fully configurable for specific requirements
- Single panel coverage: 90° azimuth and 90° elevation, hemispheric coverage achieved with four panels
- Electronic counter-countermeasures (ECCM) capabilities

Main advantages

- Combat proven
- Compact and mobile for tactical applications supports On-the-Move (OTM) Operation
- Superior Performance-to-Price Ratio, unprecedented affordability
- Extremely High Elevation Coverage, up to Hemispheric Coverage
- Multi detection range configuration – fit all scenarios



Front view

Type of Threat	Typical RCS m ²	Range km
Nano UAV	0,005	5
Mini UAV	0,1	10
Medium-Size UAV	2	23
Light Transport Aircraft	20	40
Fighter – Regular	10	34
Helicopter	2	23
Direct-Attack Rocket/Missile	0,02	7
Heavy Mortar	0,01	6
Rocket	0,005	5,1

MADDOS ToC (TAKE OVER CONTROL)

Preface

ToC is the premier cyber counter-drone platform designed to automatically detect, take over and safely land unauthorized commercial drones in a designated zone.

Functionality

ToC is an autonomous end-to-end cyber solution, providing 4 layers of security:

- **Detect** - Detecting and locating drones in the vicinity of the perimeter, using a 24/7 monitoring system.
- **Identify** - Extracting rich real-time data, including the operator's last known location and flight parameters.
Friendly drones can be whitelisted according to their serial (tail) number.
- **Control** - Mitigating airborne drone intrusions by automatically and actively taking over the control from the operator, navigating the drone to a predefined location, then landing it there safely. Intrusion is defined when a drone tries to enter a predefined geofenced area.
- **Prevent** - Denying drones from taking off from within a predefined geofenced area.

Operation

ToC uses communicating sensors that are installed in several locations around the perimeter. All sensors are connected to a central server, which syncs their operation. The server also displays a Command and Control dashboard for real-time alerts, as well as for configuring the system.

Operational Capabilities

Capability	Description
Drone detection	Detects drone activity up to a 7 km (1.24 miles) radius per sensor. According to the drone's communication signature. Can be extended if CE/FCC compliance is not required.
Drone operator detection	Extracts the operator's last known location, identify the drone model and its serial (tai) number.
Drone identification	Extracts flight parameters such as the drone's speed and altitude.
Drone flight parameter detection	Prevent stake off of unauthorized drones within a geo-fenced area.
Ground takeover, mid-air takeover	Actively takes control of an unauthorized drone that is attempting to fly into a geo-fenced area

Technology

ToC uses Electronic RF receipt and transmission technologies for the purpose of protecting perimeters from drones, as follows:

- **Detect** - Uses passive RF scanning methods, in which the relevant spectrum bands (ISM bands) are scanned continuously for known drone communications' signatures. Once a drone is located, parsing of the telemetry channel provides information about the drone's location and altitude.
- **Control & Prevent** (deny takeoff and airborne takeover) - Uses protocol manipulation techniques - essentially to surgically redirect the control from the original drone operator into our system. Protocol manipulation is a series of messages sent to the drone that are received as legitimate commands which take over the control. The controlling channel remains - at all times - without interference and continues to function normally. The level of disruption is minimal and relates only to the drone receiving unexpected command messages.



MADDOS ToC

GNSS SPOOFING

Combat proven soft-kill solution able to mitigate all kind of drones equipped with GNSS sensor, even preprogrammed or fully autonomous. The system spoofs onboard GNSS system of the drone and sends fake information to trigger mitigation process.

According to chosen mode the system will invoke different behavior on the target. Thanks to very compact size and low weight, the system can be used as stationary system mounted on a tripod or as a mobile one mounted on a vehicle.



GNSS Spoofing

Specification

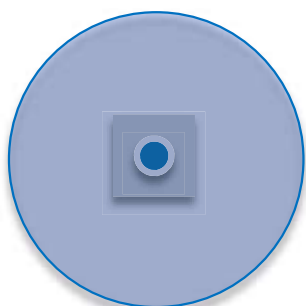
- Range: over 4km (depending on antenna set up)
- Effective frequency: L1, L2, L5
- Multi-sensor setup
- Dimensions: 300 x 300 x 96 mm
- Weight: 6kg
- MIL-STD 1275 / 704 / 461E / 810G
- IP68

Operational modes

- Divert – makes the drone to fly away from the protective zone
- Hold – drone is put in a loitering pattern
- Land – activates the drone's auto-landing feature
- Eliminate – crashes the drone by immediate descending
- Swarm – defeat multiple drones at the same time

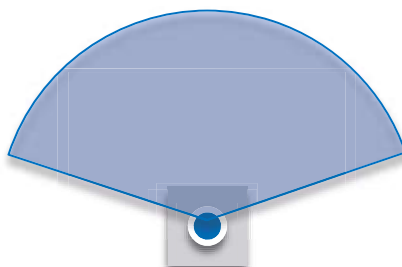
Deployment options

Omni



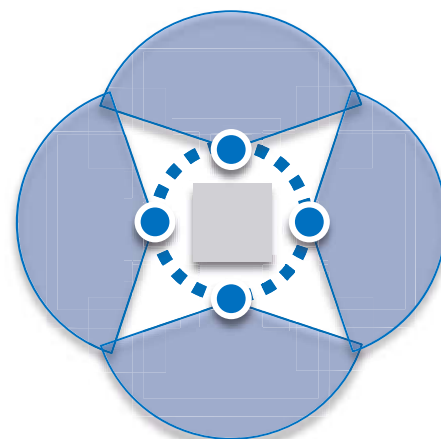
Range - 2 km

Directional



Range - 4 km
Limited collateral damage
Extended range

Multi-node



Range - Depends on deployment
Synchronized Multi-Ring Operation
Large area, limited collateral damage

Transmitting GNSS Antenna

Receiving GNSS Antenna

Spoofing effector

MADDOS ASSASSIN

Proven hard-kill solution to defeat the enemy UAV, by using physical approach. ASSASSIN drone is able to stop any intruding UAS, including pre-programmed, autonomous drones that can't be jammed or hacked. In addition it can be deployed where signal jamming is unacceptable due to civilian constraints.

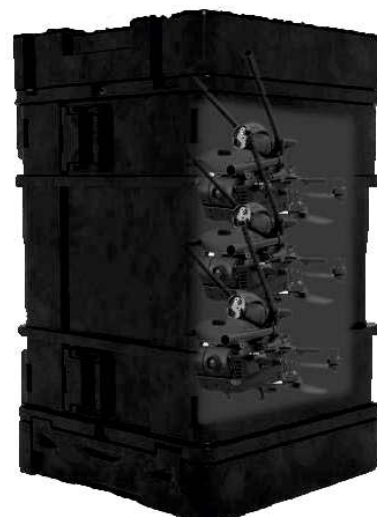
The MADDOS ASSASSIN is an advanced, mini-sized, fully autonomous drone. It can be used to inspect, track and eliminate incoming drones, by physically engaging them.



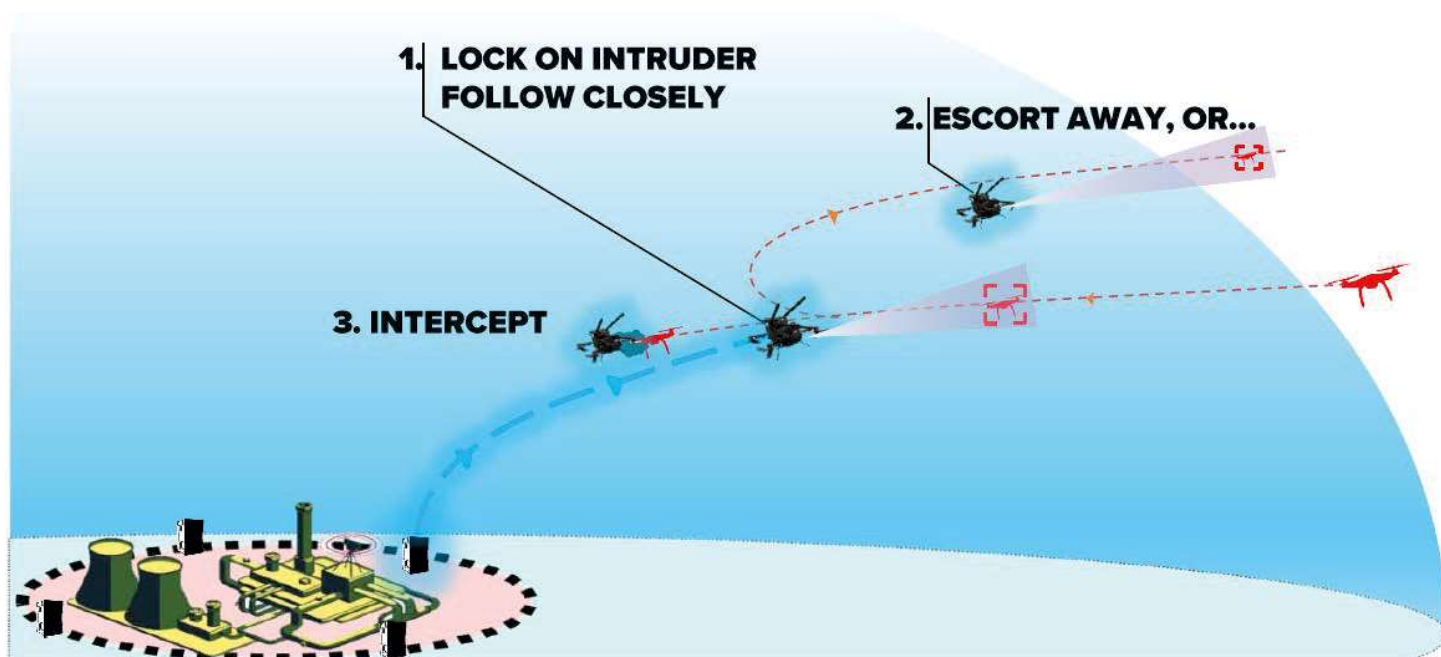
MADDOS ASSASSIN

Main features

- ✓ Day & night operation
- ✓ Fully autonomous system, no human piloting
- ✓ Integrated with MADDOS detection sensors (Radar, RF)
- ✓ Coverage up to 2km from Launch Tube
- ✓ Operating altitude up to 1000m above ground
- ✓ Max. speed 27 m/s
- ✓ Max. target velocity 22 m/s
- ✓ Can be reused after target elimination, when equipped with net launcher
- ✓ Ready to take-off from Launch Tube in 2sec after target detection



Launch Tube



Operation scheme

HIGHLIGHTS

- ✓ VTOL (vertical take off and landing) – take off and land everywhere
- ✓ Suitable for every scenario and mission
- ✓ Fully automatic missions from start to landing
- ✓ Multiple payload options
- ✓ High endurance – over 10h of flight
- ✓ High payload weight – up to 25kg
- ✓ Long communication range – up to 200km in Line of Sight (LoS)
- ✓ Full carbon fiber construction – light and durable
- ✓ Modular design – fast field assembly
- ✓ Advanced military flight controller
- ✓ Inbuilt ADS-B module and LiDAR

MADDOS VTOL 350e



Reconnaissance
and surveillance



Intelligence
gathering



Artillery fire
targeting



Police and law
enforcement



Search and
rescue



Convoy
protection

Specification	VTOL 350e	VTOL 450h	VTOL 600h
Propulsion	Fully Electric	Electric + gasoline	Electric + gasoline
Wingspan [mm]	3505	4990	6010
MTOW [kg]	22.5	100	110
Max. payload [kg]	4	20	25
Flight time [h]	2.5 - 3	7+	10+
Cruise speed [m/s]	20	30.5	29
Max. speed [m/s]	31	39	38
IP Rate	IP54 – Dust and Rain Protected		

MADDOS UAVs

Gimbal cameras

We offer all different models of camera payloads, suitable for every tactical scenario especially made for fixed wing UAVs with multiple capabilities:

- Daylight camera sensor (HD or Full HD) with x20/x30 optical zoom
- Thermal camera sensor (uncooled or cooled)
- Laser Range Finder (up to 15km range)
- Laser illuminators (visible or IR)
- Advanced onboard processing
 - * Automatic object detection and tracking
 - * Geo tagging
 - * Object classification – human/vehicle



Gimbal cameras

Flight Controller

- Advanced UAV control unit
- Autonomous missions planning software
- Inbuilt double GPS module
- x3 redundant Flight Controller unit
- Optional 4G communication
- IP67 and EMI protection
- Easy integrated with external sensors
- Customizable functionality at customer request
- DO178C, DO254 and DO160 aviation standards



Flight Controller

Ground Control Stations

- Sun-readable screens
- Internal battery for long operations
- Station for single or two operators
- Rugged enclosure
- Harsh environments use
- Highly portable control station
- High-performance applications
- Integrated antenna tracker



Ground Control Stations



Tracker



CUSTOMER GROUPS

- Military & police forces (ground & air)
- Convoys
- Airports
- Power plants
- VIP security services
- Border patrols
- Government buildings (e.g. embassies, correctional facilities)
- Events
- (concerts, political events, sports etc.)
- Seaports / marinas
- Private properties

REFERENCES