



Mini Sniffer System for UAVs



Making monitoring of vessel emissions using UAVs possible, effective and reliable.



In response to the increased demand for monitoring of emissions from ships, Explicit has developed a unique micro sensor system intended as payload on UAVs.

The system enables authorities to monitor vessel emissions using rotary UAVs equipped with gas sensors (“sniffers”) to measure sulphur and other gasses in the exhaust plumes. It couples hardware and operational software with a dedicated lab service to produce highly reliable measurement results. Coupled with rotary UAV platforms, the system offers an effective tool for screening vessel compliance with MARPOL Annex VI as part of the authorities’ enforcement efforts.

Full payload system and emissions lab service

The Explicit Mini Sniffer System includes both a Mini Sniffer Unit (payload) as well as ground control station (GCS) software to identify vessels and sample their plumes. Using the payload and proprietary GSC software, UAV teams are able to conduct sulphur inspections from the air.

From the GSC, data is relayed to Explicit’s cloud-based Emissions Lab (E-Lab) where the sensor results are analysed and quality controlled resulting in a detailed emissions report on each inspected vessel. Depending on site connectivity, the lab analysis process can either happen in near-real time or be deferred to whenever data is ready for upload.

Smart flight - a must when navigating plumes

The GSC also includes patented features to support the UAV operator’s navigation in the exhaust plume as well as automated quality scoring to allow the operator to quickly assess the reliability of each measurement.

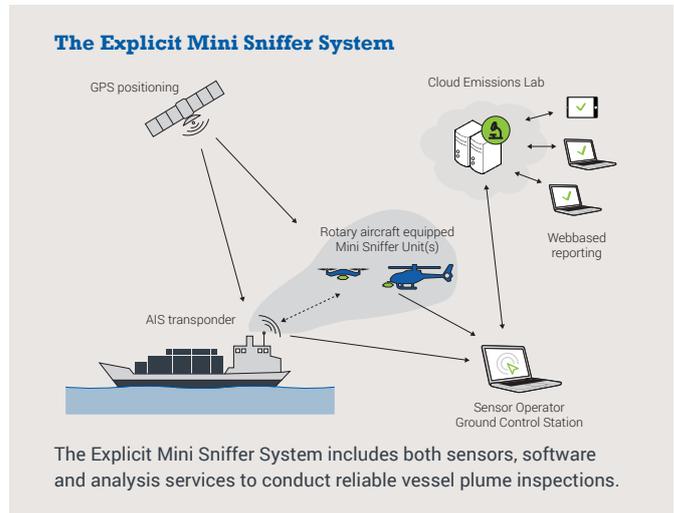
Multiple parallel sampling and lowest uncertainty

The Explicit Mini Sniffer System has been independently verified to have the lowest uncertainty of any sniffer system available. Deploying several Mini Sniffer Units in parallel (subject to weight) uncertainties can be further optimized.

The Explicit Mini Sniffer System and E-lab Service has been validated on more than 900 vessels. It is currently being used by leading authorities for emissions enforcement monitoring.

Certified calibration and replacement

Every Mini Sniffer Unit comes ready-to-use with a certificate of calibration from FORCE Technology, the independent Danish Government Reference Lab for Air Emissions. No in-field calibrations or device maintenance is needed. Automatic replacement units are included in any system subscription.



Key benefits



Only validated and operational mini sniffer system available for compliance monitoring.



Lowest uncertainties of any sniffer system



Integrated Emissions Lab Service



Full system with detailed emissions reports on compliance.



User-friendly. No need for in-field calibration



Patented smart flight feature to assist in-plume navigation



Certificates of calibration by FORCE Technology



Built-in quality scoring on all measurements.





For Integration



Description

Mini Sniffer Unit for integration on appropriate rotary UAV airframes. The unit comprise all necessary sensors to conduct fuel sulphur content (FSC) and NO_x measurements of ship plumes. The unit relies on access to the UAV flight controller in order to relay position and sensor data to the GSC. This option is intended for cases with payload weight restrictions and/or long-term operations.

Technical specifications

- Sensors:** SO₂, CO₂, NO, NO₂, temperature, humidity
- Payload weight and size:** 500g, L145 x H75 x W63 mm
- Inlet:** Teflon tube, max. length up to 500 mm. Note, the tip (50 mm) must be placed in free air, away from immediate turbulence.
- Outlet:** Rubber tube, max. 1000 mm. Placeable anywhere.
- Power requirement:** 5v, 150 mA (unit); 6v, 300 mA (pump)
- Mount:** 4 mounting holes
- Data interface:** Serial TTL
- Maintenance:** Units are delivered ready for operation with a certificate of calibration. No further calibration is needed. Each unit includes 100 hours of operation. Units should be replaced after this or at least every 2 years (included in system subscription).
- Other considerations:** Unit data output must be combined with the UAV GPS track and separately sourced AIS data in order to compile a vessel emissions report. See below.

Standalone



Description

Mini Sniffer Unit as standalone payload for appropriate UAV airframe. The unit comprise all necessary sensors to conduct fuel sulphur content (FSC) and NO_x measurement of ship plumes. It also includes controller, radio link and GPS receiver to allow the unit to communicate directly with the GSC. This option is intended for scenarios where there is a preference not to integrate with the UAV systems and/or short-term operations.

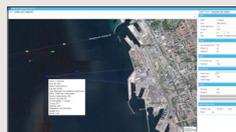
Technical specifications

- Sensors:** Same as integrated
- Payload weight and size:** Approx. 900g (subject to mount), L240 x H95 x W220 mm (subject to mount)
- Inlet:** Same as integrated
- Outlet:** Same as integrated
- Power requirement:** 4S or 6S, up to 22v
- Mount:** Subject to UAV airframe. Explicit is able to produce custom-mount solutions for most leading UAV airframes.
- Maintenance:** Units are delivered ready for operation with a certificate of calibration. No further calibration is needed. Each unit includes 100 hours of operation. Units should be replaced after this or at least every 2 years (included in system subscription).
- Other considerations:** Unit data must be combined with separately sourced AIS data to compile a final vessel emissions report. See below.

OR

GSC and E-Lab Service

In addition to the sensor payload, the Explicit Mini Sniffer System includes GSC software to identify vessels, navigate plumes, and compile emissions data. Once collected, data is relayed to the Explicit Emissions Lab Service (cloud) for analysis and quality control resulting in a detailed emissions report on each vessel. The GSC software and E-Lab Service ensures reliable emissions results. Final datasets are made available via Explicit's webbased reporting portal that also includes search, statistics and map tools.



Smart Flight – patented technology

Navigating ship plumes can be very difficult, since the smoke is not visible. Explicit's GSC solution includes a unique option for locating the plume's position using local weather data, simulation tools, and a patented Smart Flight feature to assist the UAV pilot in achieving the optimal sample position using live sensor feedbacks.

About Explicit

Founded in 1998, Explicit is an experienced technology company specializing in micro sensor technology and data systems for environmental monitoring and mapping at sea.

Our work is focused on enabling environmental data collection by building smart payloads and robust data infrastructures that allow maritime authorities and others to perform surveillance and enforcement at sea.

Designed for UAVs and manned helicopters, and coupled with advanced software solutions we create unique environmental knowledge through smart data collection.

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