

DR1000 Flying Laboratory, Drone Environmental Monitoring

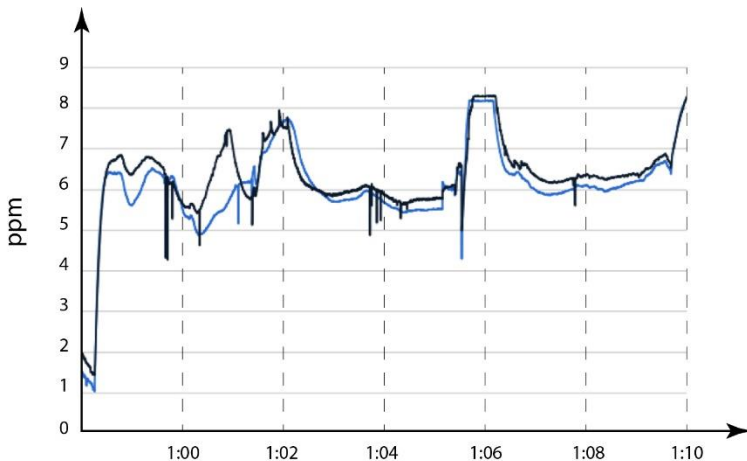


Mission Statement

The Scentroid DR1000 is a fully capable flying laboratory, used to sample and analyze ambient air at heights of up to 150 meters above ground. Air quality mapping, model verification, analysis of potentially dangerous sites are all made possible by this novel innovation.

Live Chemical Monitoring

The Scentroid DR1000 flying laboratory provides continuous monitoring of multiple chemicals. While in flight, five built-in chemical sensors can provide remote monitoring of chemicals selected at the time of ordering. Chemical monitoring can be provided for H₂S, CH₄, CO₂, SO₂, VOCs, and close to 30 other selected chemicals. Sensor readings along with GPS position and altitude can provide 3D mapping of ambient pollution and odour levels. This feature can also be used to guide the operator into a plume for bag sampling. See the table on page 11 for a list of the available sensors.



DR1000 can be equipped with up to 5 sensors from Scentroid sensor list.



*Check our sensor list on the last page

Improves Air Sampling Capability over Difficult Terrain & at Different Heights

It is often necessary to sample stacks, ponds, and other location where human access is difficult and /or dangerous. Furthermore, operator exposure to dangerous chemicals during sampling must be carefully considered. The Scentroid DR1000 flying laboratory allows the operator to stay safely away from potentially hazardous sources while acquiring live readings or air sample for laboratory analysis. The DR1000 can also be analyze and sample ambient air at an elevation of up to 150 meters above ground level that was previously impossible to accomplish.



Endless Application

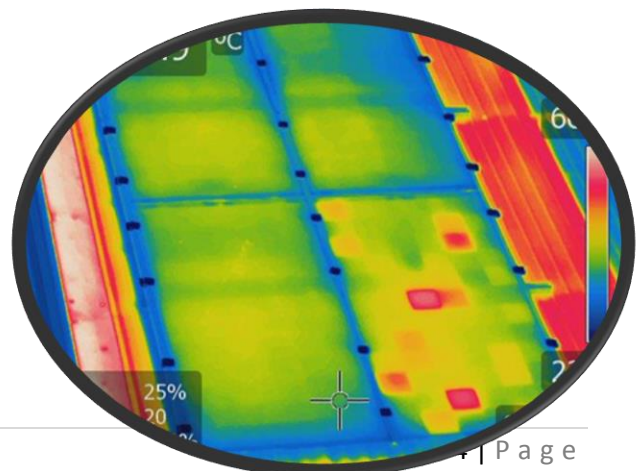
The DR1000 Flying laboratory provides a robust platform to conduct impact assessment and air quality measurement for a wide range of applications including monitoring of:

- Fugitive emission
- Flare emission
- Leak detection along oil pipe lines
- Landfill methane
- Odour emission
- And much more!



Thermal Imaging

A thermal imaging camera can also be installed for visual confirmation of fugitive emissions in a variety of applications such as landfills, storage tanks, and oil/gas pipes.



Recommended Drone

DR1000 is completely self-contained and requires nothing from attached drone except as a vehicle. DR1000 can be attached to any Rotary Wing or Fixed Wings drone with payload capabilities of 3 kg. An example of commonly used drones are DJI S1000 and DJI MATRICE 600.



Dust Monitoring

The Scentroid DR1000 flying laboratory can also provide continuous monitoring of PM 1, 2.5 and 10 using a laser scattered particulate counter. The dust monitoring can be installed in addition to the 5 chemical sensors for complete ambient air quality assessment



Direct Flare Plume Sampling

The DR1000 can be flown into the plume of a flare to take direct samples for analysis for chemical composition and olfactometry. Temperature and humidity of the plume are also measured to ease dispersion calculation as well as to keep the drone safe.



Communication

DR1000 will come with simultaneous GPRS and WIFI communication capabilities. The GPRS is used to send data to Scentroid cloud server called Drone Information Management System (DRIMS). The secure online system will allow you to remotely monitor and even control the flying laboratory as well as store and process the data collected. The Drone also connects to the ground station using WIFI communication protocol. Both Ground station and Cloud based servers run DRIMS software and simultaneously can log data from multiple DR1000 drones.

The screenshot displays the SCENTROID DRIMS Management web interface. The header includes the SCENTROID logo and the tagline 'Future of Sensory Technology'. A user profile for 'Admin User()' is visible in the top right corner with a 'Sign Out' button. The main content area is titled 'Latest Samples for FlyingLaboratory-DR091601' and features two buttons: 'Back to Equipment' and 'Grab Sample'. The data is organized into a grid of sample cards:

Sample Name	Value	Unit	Time
Nitrogen Dioxide-LC	0.000	PPM	3 days ago
Carbon Monoxide-LC	0.113	PPM	10 days ago
PID-LC	0.000	PPM	3 days ago
PM1	0.00	ug/m3	3 days ago
Sulfur Dioxide-LC	0.000	PPM	3 days ago
PM2.5	1.22	ug/m3	3 days ago
Carbon Dioxide-LC	0.000	PPM	3 days ago
PM10	0.11	ug/m3	3 days ago



Ground Station

The Ground station that is included with every DR1000 Flying Laboratory consist of a specialized laptop with pre-installed Ubuntu and Windows 10 operating systems, high gain powerful communication antenna, and DRIMS software. DRIMS (Drone Information Management Software) provides the user with means to control the flying laboratory and log all acquired data. DRIMS will provide both live data as well as all historical data for all sensors plus GPS position, altitude, temperature, and humidity. The user can also command the drone when to take the sample, select the sampling interval, adjust sampling rate, and perform routine maintenance such as calibration of sensors. If an optional on-board camera is selected the video feed will also be sent to the ground station for simultaneous viewing. The laptop will be dual boot and can be used for other work including GIS mapping, viewing flight path on Google Earth, data post processing, or any other task.



DR1000 Specification

Manufacturer	Scentroid
Model	Scentroid DR1000 flying laboratory
Maximum operating time with full charge battery	2.5 hours
Time to fill up a sample bag	5 Sec per Liter
Weight	3410 g
Dimension	26cm x 16cm x 18cm



Scentroid Flying Laboratory DR1000



<http://scentroid.com/scentroid-dr1000/>

Sensor List

#	Sensor ID	Type	Chemical	Maximum Detection Limit	Lowest Detection Threshold	Resolution (ppm)	Cross sensitivity
1	CD1	NDIR	Carbon Dioxide - High Concentration	5%, 20% and 100%	20 ppm	100, 2000, 10000 ppm	NONE
2	CD2	NDIR	Carbon Dioxide - Low Concentration	5000 ppm	0 ppm	15 ppm	NONE
3	CO1	EC	Carbon Monoxide (low Concentration)	500 ppm	15 ppm	5 ppm	H2 <10%
4	CO2	EC	Carbon Monoxide (high concentration)	10000 ppm	250 ppm	20 ppm	H2 <10%
5	C11	EC	Chlorine	20 ppm	200 ppb	20 ppb	H2S, NO2
6	E1	EC	Ethylene Oxide	100 ppm	1 ppm	0.1 ppm	H2S, NO, C2H4
7	H1	EC	Hydrogen	5000 ppm	1 ppm	0.8 ppm	C2H4
8	HCL1	EC	Hydrogen Chloride	100 ppm	0.1 ppm	0.1 ppm	H2S, NO2, CL2
9	HCY1	EC	Hydrogen Cyanide	100 ppm	0.1 ppm	0.1 ppm	H2S, NO2
10	AM1	EC	Ammonia	100 ppm	0.5 ppm	0.3 ppm	H2S, NO2, CL2
11	ON1	EC	Oxidizing Gases Ozone and Nitrogen Dioxide	O3- 20; NO2- 20 ppm	20 ppb	15 ppb	H2S, CL2
12	PH1	EC	Phosphine (low Concentration)	10 ppm	50 ppb	30 ppb	H2S, C2H4,
13	PH2	EC	Phosphine (high Concentration)	2000 ppm	5 ppm	2 ppm	H2S, C2H4,
14	HS1	EC	Hydrogen Sulfide (low Conc - ppb)	1 ppm	3 ppb	1 ppb	CL2<20%
15	HS2	EC	Hydrogen Sulfide (high Conc - ppm)	2000 ppm	1 ppm	1 ppm	CL2<20%
16	E2	MOS	Organic solvents (Ethanol, Iso-Butane, H2)	500 ppm	0 ppm	1 ppm	Benzines <20%
17	MT1	NDIR	Methane (LEL)	100 % LEL (50,000 ppm)	500 ppm	200 ppm	Methane, propane,
18	NC1	EC	Nitric Oxide - NO - (low Concentration)	20 ppm	15 ppm	5 ppb	None
19	NC2	EC	Nitric Oxide - NO (High Concentration)	5000 ppm	2 ppm	1 ppm	None
20	ND1	EC	Nitrogen Dioxide (Low Concentration)	20 ppm	0.03 ppm	0.02 ppm	H2S, CL2,
21	ND2	EC	Nitrogen Dioxide (high Concentration)	200 ppm	0.3 ppm	0.1 ppm	H2S, CL2,
22	O1	EC	Oxygen	20%	0.01%	0.01%	NONE
23	O2	EC	Oxygen	100%	0.20%	0.10%	NONE
24	PD1	PID	Total VOCs (ppb) - PID	50 ppm (isobutylene)	0 ppm	1 (ppb isobutylene)	All VOCs
25	PD2	PID	Total VOCs (ppm) - PID	300 ppm (isobutylene)	1 ppm	0.1 (ppm isobutylene)	All VOCs
26	SD1	EC	Sulfur Dioxide (high Concentration)	2000 ppm	0.5 ppm	0.5 ppm	NO2, CL2
27	SD2	EC	Sulfur Dioxide (low Concentration)	20 ppm	10 ppb	5 ppb	NO2, CL2
28	FM1	EC	Formaldehyde	10 ppm	0.01 ppm	0.01 ppm	Ethanol
29	PM 1-10	Laser Scattered	Particulate PM 1, 2.5, 10 (simultaneous)	10,000 Particles/Sec	PM 1	N/A	NA
30	MS1	MOS	General Purpose Odours (VOCs)	1000 ppm isobutanol	0.5	0.5	VOCs and Solvents
31	MS2	MOS	TRS and Amines	3 ppm (Methyl Mercaptan)	10 ppb	10 ppb	Trimethyl Amine, Methyl Mercaptans, H2S, other amines and sulfur compounds
32	MS3	MOS	Air Contaminants (ammonia, Ethanol, Toulene)	3 ppm (ammonia)	10 ppb	10 ppb	(ammonia, Ethanol, Toulene)
33	MS4	MOS	Ammonia	300	10	0.5	Ammonia, H2S, Ethanol



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