



CopterSonde 3

WxUAS Boundary Layer Vertical Profiler Technical Data Sheet

Purpose-built, Rotary-wing UAS for Boundary Layer Profiles

The CopterSonde 3* reimagines boundary layer observations by combining the efficiency of UAS-based operations with proven radiosonde-quality sensors. This breakthrough technology offers exciting new opportunities for atmospheric research *and* operational meteorology.

Three Air Temperature and Humidity sensors are mounted in a custom-built enclosure with a front-facing intake duct to protect the sensors and supply undisturbed air for sampling. A programmable, integrated fan ensures proper aspiration at 10 m/s for consistent data quality. All system elements are designed to isolate the PTU sensors from electronic and physical interference.

A Comprehensive Observation Platform

The CopterSonde 3 is a complete, turn-key design that measures all atmospheric variables observed by traditional radiosondes (Air Temperature, Humidity, Barometric Pressure and Wind Speed/Direction). The intake scoop is a modular design that allows for future development of pollution and gas sensing options.

Autonomous and semi-autonomous flight modes allow the aircraft to be used as a radiosonde analog - producing conventional met data products ready for input to forecast models. Raw data and standardized meteorological messages allow for many data plot options including Skew-T Log-P, hodograph and contour data visualizations.

Wind Vane Flight Mode

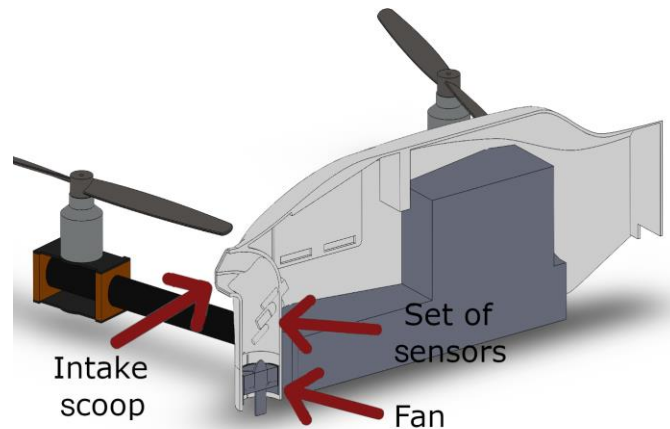
CopterSonde 3 uses proprietary algorithms working in tandem with the aircraft's autopilot and inertial measurement units (IMUs) to adaptively turns the drone into the wind. Wind speed is calculated from the energy required to keep the aircraft horizontally stationary while profiling vertically, eliminating the need for an auxiliary anemometer.

Wireless Data Streaming in Real-Time

Weather data and messages are sent to the ground station in real-time using the Micro Air Vehicle Link (MAVLink) protocol. Sensors and messages can be monitored without the need for cloud-based post processing. Users have immediate access to data in real time, with more extensive information stored on removable media.

A World-Class Team

The Coptersonde project brings together the University of Oklahoma - one of the world's leading centers of atmospheric research and engineering, with InterMet System's 25 years' experience building operational radiosondes. The result is a high-quality, sensor-oriented design *at an affordable price*.



InterMet

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Platform Technical Specifications

Drone Dimensions

Weight (ex. battery)	1.5 kg (3.3 lbs)
Average All-up Weight	2 kg (4.4 lbs)
Diagonal	51 cm
Height	15 cm

Communications

Telemetry Frequency (Data)	915 MHz
Flight Controller Frequency	2.4 GHz
Transmission Distance	up to 5 km
ADSB Equipped	Yes
Remote ID Compliance	Yes
System Computer	Toughbook Model 55

Field Cases (dimensions, approx. loaded weight)

Primary (Drone)	Pelican 1630: 79x61x46 cm, 18 kg
Accessories and Tools	Pelican 1600: 61x48x23 cm, 10 kg
Batteries and Charger	GPCDJIP4BTRY: 38x30x18 cm, 7 kg

Propulsion Systems

Motors	Brushless, 780 KV
T-Style Propeller Material	Polymer
Attachment Style	10 mm SS Screws

Power

Battery Type	4S Smart HV-LiPo
Capacity	5870 mAh
Typical Flight Endurance	15 min
High Wind Failsafe Return	Included
<i>Standard system includes eight batteries with charger</i>	

Meteorological Specifications

Thermodynamic

Primary Variables	Pressure, Temperature, Humidity
Derived Variables	$T_d, T_v, \theta, \theta_e, \theta_\omega, r, r_s, q, q_s, e, e_s, LCL, \Gamma$
Accuracy	T: ± 0.3 °C RH: ± 5 % p: ± 1.5 mbar
Raw Data Rate	4 Hz

Kinematic

Primary Variables	Tilt Angles
Derived Variables	Horizontal wind speed and direction
Accuracy	Wind Speed: ± 0.6 m/s Wind Direction: $\pm 4^\circ$
Raw Data Rate	4 Hz

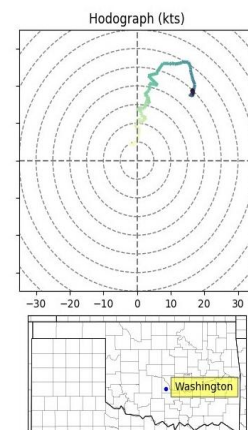
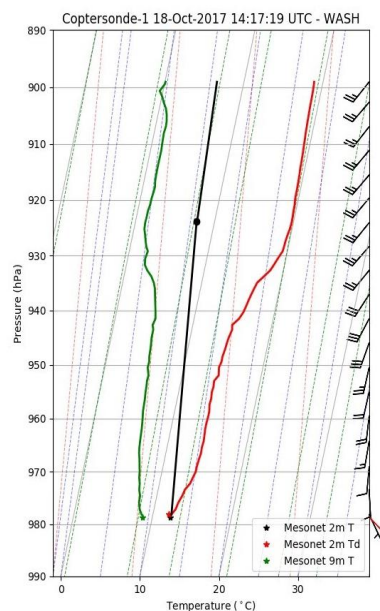
Available Meteorological Messages

Altitude Message	5 m height levels
NetCDF	WMO Specified



Operating Conditions

Mean Wind Speed	22 m / s (43 knots)
Sustained Max Wind Gust	26 m / s (50 knots)
Maximum Flight Ceiling MSL	3 km (~10,000 ft)
Maximum Flight Altitude	1.5 km AGL
Recommended Operating Temp.	-20 to 40 °C
Typical Ascent Rates	1 – 5 m / s
Typical Descent Rates	1 – 6 m / s



LCL = 924 hPa
SBCAPE = -1.82 J kg^{-1}
0-720 m bulk shear = 20 kts