

## Dropsonde RD41



### Features

- Designed for atmospheric profilings from aircraft flight level to surface
- Used for tropical cyclone reconnaissance and research, data acquisition over oceans as input for Numerical Weather Prediction (NWP) models, and in various field campaigns to acquire data for meteorological research and for validation of other airborne instrumentation
- Measures pressure, temperature, and humidity values, and reads wind direction and speed data from the point of launch to the surface
- Airborne Vertical Atmospheric Profiling System (AVAPS®) onboard the aircraft receives, displays, stores, and distributes dropsonde data for further use

Dropsonde RD41 is a meteorological measurement device for use in atmospheric profilings from aircraft flight level to surface. Descending through the atmosphere by a parachute, it measures the profiles of pressure (P), temperature (T), and relative humidity (U), and reads wind direction and speed data from the point of launch to the surface.

Dropsonde RD41 is used for tropical cyclone reconnaissance and research, data acquisition over oceans as input for Numerical Weather Prediction (NWP) models, and in various field campaigns to acquire data for meteorological research and for validation of other airborne instruments. RD41 transmits data to the Airborne Vertical Atmospheric Profiling System (AVAPS®) onboard the aircraft using narrow bandwidth Frequency Shift Key (FSK) modulation in the 403 MHz meteorological band.

### Proven Measurement Performance

RD41 is based on the same Vaisala-made sensors and unique measurement technology as the RS41 radiosonde family. The temperature sensor utilizes linear resistive platinum technology and is very stable. The humidity sensor integrates humidity and temperature sensing elements. The pressure sensor is the same high-quality, shock-resistant capacitive silicon sensor as the one in Vaisala Radiosonde RS92 and Dropsonde RD94, but with revised electronics and calibration. All sensors are calibrated against references that are traceable to international standards. The sensors are effectively protected from freezing, wet bulb, and solar radiation errors. Winds are measured using a commercial GPS receiver. Wind profiles from multiple simultaneous dropsondings show good consistency.

### Designed for Aircraft Use

RD41 is designed for aircraft use, and it is launched through the body of an aircraft. Specially designed launchers are used for both pressurized and unpressurized cabin aircrafts. The delayed deployment

mechanism ensures proper clearance from the aircraft and allows the parachute to open safely. The specially designed parachute stabilizes RD41 by aligning it properly for measurements, and its small gliding factor ensures proper measurement of wind speed and direction. The descent speed of the RD41 is approximately 11 m/s at the sea level and about 21 m/s in 12-km altitude. In strong convective circumstances, the descent rate can vary, and even negative (descent) rates are measured.

RD41 measures PTU values twice, and wind speed and direction readings four times a second. This means that the last measured pressure level is about 5-6 meters above the surface at maximum. The robust design of RD41 ensures safe use of the legacy launchers and high speed deployment of the parachute.

### Dropsonde Receiving System

Onboard the aircraft, the AVAPS® system receives, displays, stores, and distributes dropsonde data for further use. AVAPS® is compatible with dropsondes, not with the conventional Vaisala radiosondes, and vice versa. AVAPS® can be configured to track up to eight dropsondes at the same time. This is an essential ability in operations carried out with a high-speed, high-altitude aircraft when dense horizontal resolution of data is required. AVAPS® can be set to provide the data automatically for the aircraft data system for further use. Dropsonde technology developer NCAR/EOL provides ASPEN data post-descent processing software for dropsonde users.

# Technical Data

## Dropsonde RD41

Weight	350 g
Size	Diameter 70 mm, length 410 mm
Maximum deployment airspeed	325 KIAS (indicated airspeed)
Shelf life	1 year from delivery

## Transmitter - EN302054

Tuning range	400.16 ... 405.99 MHz
Frequency stability	< ±10 kHz
RF power output	< 200 mW
Channel spacing	200 kHz
Modulation	FSK
Harmonic and spurious output	According to EN302054
Telemetry range with recommended receiving antenna	325 km

## Battery

Type	Two lithium 123 cells in series
Voltage	6 V nominal
Life	2 hours (operating), 3 years (shelf)

## Pressure Sensor (P)

Type	Silicon capacitor
Range	From surface pressure to 3 hPa
Resolution	0.01 hPa
Repeatability <sup>1)</sup>	0.4 hPa

<sup>1)</sup> Standard deviation of differences between two successive repeated calibrations, k = 2 confidence level

## Temperature Sensor (T)

Type	Platinum resistor
Range	-90 ... +60 °C
Resolution	0.01 °C
Repeatability <sup>1)</sup>	0.1 °C
Response time (when used and measured in Vaisala Radiosonde RS41):	
6 m/s, 1000 hPa	0.5 s

<sup>1)</sup> Standard deviation of differences between two successive repeated calibrations, k = 2 confidence level

## Relative Humidity Sensors (U)

Type	Thin-film capacitor
Range	0 ... 100 %RH
Resolution	0.1 %RH
Repeatability <sup>1)</sup>	2 %RH
Response time (when used and measured in Vaisala Radiosonde RS41):	
6 m/s, 1000 hPa, +20 °C	< 0.3 s
6 m/s, 1000 hPa, -40 °C	< 10 s

<sup>1)</sup> Standard deviation of differences between two successive repeated calibrations, k = 2 confidence level

## Wind (Horizontal)

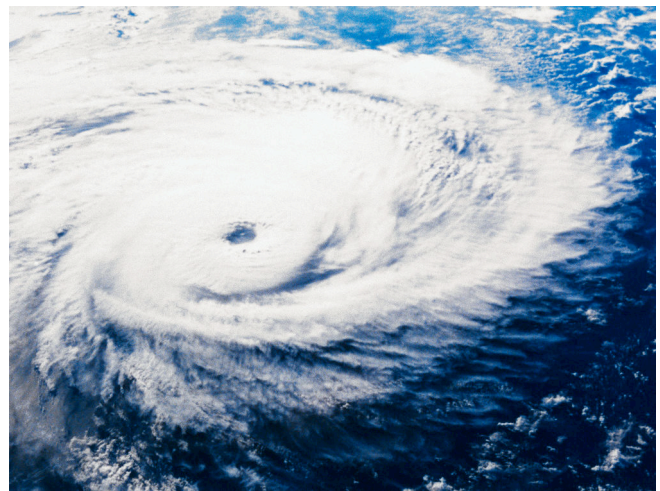
Commercial GPS receiver

## Data Rates

PTU update rate	2 Hz
Wind update rate	4 Hz

## Descent

Descent speed	Approx. 11 m/s at sea level
<b>Descent Time</b>	
From 14 km	Approx. 15 mins
From 7.5 km	Approx. 8 mins



## Intellectual Property Rights and Development

Vaisala Inc., USA, manufactures and markets the Dropsonde RD41 and AVAPS® Dropsonde Receiving System under license to University Corporation for Atmospheric Research Foundation (UCARF). The dropsonde and receiving system hardware and software have been developed at the Earth Observing Laboratory (EOL) of the National Center of Atmospheric Research (NCAR), in Boulder, Colorado, USA. AVAPS® is a registered trademark of the University Corporation for Atmospheric Research.



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