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 measures pressure, temperature, and humidity values, and reads wind direction and speed data from the point of launch to the surface.

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 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.

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.

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.
Technical Data

**Dropsonde RD41**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>350 g</td>
</tr>
<tr>
<td>Size</td>
<td>Diameter 70 mm, length 410 mm</td>
</tr>
<tr>
<td>Maximum deployment airspeed</td>
<td>325 KIAS (indicated airspeed)</td>
</tr>
<tr>
<td>Shelf life</td>
<td>1 year from delivery</td>
</tr>
</tbody>
</table>

**Transmitter - EN302054**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuning range</td>
<td>400.16 ... 405.99 MHz</td>
</tr>
<tr>
<td>Frequency stability</td>
<td>&lt; ±10 kHz</td>
</tr>
<tr>
<td>RF power output</td>
<td>&lt; 200 mW</td>
</tr>
<tr>
<td>Channel spacing</td>
<td>200 kHz</td>
</tr>
<tr>
<td>Modulation</td>
<td>FSK</td>
</tr>
<tr>
<td>Harmonic and spurious output</td>
<td>According to EN302054</td>
</tr>
<tr>
<td>Telemetry range with recommended receiving antenna</td>
<td>325 km</td>
</tr>
</tbody>
</table>

**Battery**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Two lithium 123 cells in series</td>
</tr>
<tr>
<td>Voltage</td>
<td>6 V nominal</td>
</tr>
<tr>
<td>Life</td>
<td>2 hours (operating), 3 years (shelf)</td>
</tr>
</tbody>
</table>

**Pressure Sensor (P)**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Silicon capacitor</td>
</tr>
<tr>
<td>Range</td>
<td>From surface pressure to 3 hPa</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01 hPa</td>
</tr>
<tr>
<td>Repeatability 1)</td>
<td>0.4 hPa</td>
</tr>
</tbody>
</table>

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

**Temperature Sensor (T)**

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

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

**Relative Humidity Sensors (U)**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Thin-film capacitor</td>
</tr>
<tr>
<td>Range</td>
<td>0 ... 100 %RH</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 %RH</td>
</tr>
<tr>
<td>Repeatability 1)</td>
<td>2 %RH</td>
</tr>
<tr>
<td>Response time (when used and measured in Vaisala Radiosonde RS41):</td>
<td>6 m/s, 1000 hPa, +20 °C, &lt; 0.5 s</td>
</tr>
<tr>
<td></td>
<td>6 m/s, 1000 hPa, -40 °C, &lt; 10 s</td>
</tr>
</tbody>
</table>

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

**Wind (Horizontal)**

Commercial GPS receiver

**Data Rates**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTU update rate</td>
<td>2 Hz</td>
</tr>
<tr>
<td>Wind update rate</td>
<td>4 Hz</td>
</tr>
</tbody>
</table>

**Descent**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descent speed</td>
<td>Approx. 11 m/s at sea level</td>
</tr>
<tr>
<td>Descent Time</td>
<td>From 14 km: Approx. 15 mins</td>
</tr>
<tr>
<td></td>
<td>From 7.5 km: Approx. 8 mins</td>
</tr>
</tbody>
</table>

**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.