



Vaisala Radiosonde RS41-D – accuracy and reliability with Vaisala Radiotheodolite RT20 systems.

Independent and Passive Windfinding

The Vaisala Radiosonde RS41-D is the RS41 radiosonde model for Vaisala Radiotheodolite RT20 systems. RS41-D measures pressure, temperature and humidity, and RT20 provides a passive and independent windfinding solution.

RS41-D PTU Sensors

The Vaisala Radiosonde RS41 temperature sensor utilizes linear resistive platinum technology known for its high stability. The small size of the sensor results in low solar radiation error and guarantees fast response. It also incorporates effective protection against evaporating cooling, a phenomenon occasionally encountered when a radiosonde emerges from a cloud top.

The humidity sensor integrates humidity and temperature sensing elements. Preflight automatic reconditioning of the humidity sensor effectively removes chemical contaminants and ensures excellent humidity measurement accuracy. The integrated temperature sensor is used to compensate the effects of solar radiation in real time. The sensor heating function enables an active and effective de-icing method at freezing conditions during the flight. The humidity sensor also responds quickly to detect fine structures of the atmosphere.

The pressure sensor is the same high-quality, shock-resistant capacitive silicon sensor as the one in the Vaisala Radiosonde RS92 with revised

electronics and calibration. All the RS41 sensors are calibrated against references that are traceable to international standards (SI units) and measurement uncertainties are estimated according to recommendations of the Joint Committee for Guides in Metrology, 100:2008.

Carrying Out Ground Checks on a RS41 Radiosonde

RS41 ground check includes several functional checks: temperature check, humidity sensor recondition, humidity check and setting radiosonde parameters. Ground check is performed prior to flight for a radiosonde placed on the Ground Check Device MWH322/RI41 conveniently operated with MW32/MW41 software.

Short range wireless communication link is used in ground check devices for turning radiosonde power on and for data transfer during the ground check. The communication link is based on the RF technique within the range around 4 cm.

For the pressure measurement ground check, the sounding software compares pressure sensor reading difference against an optional barometer module installed inside the ground check device, and adjusts the measurement accordingly. Alternatively an external precision barometer can be used as the reference value and the readings entered manually.

Features

- Independent and passive windfinding with Vaisala Radiotheodolite RT20 systems
- Superior PTU measurement performance
- Automated ground check
- Robust and easy-to-use design with informative LEDs
- Stable narrow-band transmission complies with ETSI standard EN 302 454
- Unwinder for consistent sensor boom positioning

Technical Data

Measurements

Measurement cycle	1 s
Temperature Sensor	Type: Platinum Resistor
Measurement range	+60 °C to -90 °C
Resolution	0.01 °C
Response time (63.2%, 6 m/s flow, 1000 hPa) ¹⁾	0.5 s
Stability 1 year / 3 years	< 0.05 °C / < 0.1 °C
Accuracy (Repeatability & Combined uncertainty with k=2)	
Repeatability in calibration	0.1 °C
Combined uncertainty after ground preparation	0.2 °C
Combined uncertainty in sounding < 16 km	0.3 °C
Combined uncertainty in sounding > 16 km	0.5 °C
Reproducibility in sounding	
> 100 hPa ²⁾	0.15 °C
< 100 hPa ²⁾	0.30 °C
Humidity Sensor	Type: Thin-Film Capacitor
Measurement range	0 to 100 %RH
Resolution	0.1 %RH
Response time	
6 m/s, 1000 hPa, +20 °C	< 0.3 s
6 m/s, 1000 hPa, -40 °C	< 10 s
Accuracy (Repeatability & Combined uncertainty with k=2)	
Repeatability in calibration	2 %RH
Combined uncertainty after ground preparation	3 %RH
Combined uncertainty in sounding	4 %RH
Reproducibility in sounding ²⁾	2 %RH
Pressure	Type: Silicon Capacitor
Measurement range	from surface pressure to 3 hPa
Resolution	0.01 hPa
Accuracy (Repeatability & Combined uncertainty with k=2)	
Repeatability in calibration	
> 100 hPa	0.4 hPa
100 - 3 hPa	0.3 hPa
Combined uncertainty in sounding	
> 100 hPa	1.0 hPa
100 - 3 hPa	0.6 hPa
Reproducibility in sounding ²⁾	
> 100 hPa	0.5 hPa
100 - 3 hPa	0.3 hPa

1) After applying time-lag correction, the effect to measurement uncertainty is negligible.

2) Standard deviation of differences in twin soundings, ascent rate above 3 m/s for temperature and humidity

Telemetry

Compatibility	With Vaisala Radiotheodolite RT20 systems
Transmitter type	Synthesized
Frequency band	1668.4 MHz - 1690 MHz
Tuning range	1668.6 - 1689.8 MHz
Maximum transmitting range	up to 160 km
Emission bandwidth	According to EN 302 454
Output power (high-power mode)	200 mW, typical
Sideband radiation	According to EN 302 454
Modulation	GFSK
Frequency setting	Wireless with ground check device

Operational Data

Power-up	Wireless with ground check device or with switch
Factory calibration	Stored on Flash memory
Battery	2 pcs AA-size Lithium cells
Operating time	> 135 min
Weight EPS / plastic covers	84 g / 113 g
Dimensions ¹⁾	Body (L x W x H): 155 x 63 x 46 mm Sensor boom bent (L x W x H): 282 x 63 x 104 mm
Environmental tests (transit drop, vibration)	MIL-STD-810G

1) For EPS cover, without wire antenna

Unwinder

Material of the string	Non-UV treated polypropylene
Tenacity	< 115 N
Length of the string	55 m
Unwinding speed	0.35 m/s
Weight	25 g

Measurement performance data is expressed with 2-sigma confidence level (k=2), unless otherwise explicitly specified.

For humidity, the performance data is valid T > -60 °C

