



Vaisala radiosondes are known for their accuracy, reliability, and ease of use.

Temperature and humidity sensors

Vaisala Radiosonde RS41 temperature sensor is stable, using linear resistive platinum technology. The small size of the sensor results in low solar radiation error and guarantees fast response. It also effectively protects against evaporating cooling, the phenomenon occasionally encountered when a radiosonde emerges from a cloud top. RS41 humidity sensor integrates humidity and temperature sensing elements to provide unique features. Preflight automatic recondition of the humidity sensor effectively removes chemical contaminants and ensures excellent humidity measurement accuracy. The integrated temperature sensor compensates the effects of solar radiation in real time resulting in very precise measurement. The sensor heating function enables an active and effective deicing method at freezing conditions during the flight. The humidity sensor responds quickly to detect fine structures of the atmosphere.

RS41 ground check

Automated ground check before flight includes temperature check, humidity sensor recondition, humidity check, and setting radiosonde parameters.

Wind data, height, and pressure

Wind is derived from velocity based on satellite carrier frequency changes. Height and pressure are based on satellite ranging codes, either combined with differential corrections from the ground system, or using multiple GNSS systems which enhance accuracy and mitigate GNSS interference. Pressure calculation is supplemented with temperature and humidity data.

Data transmission

RS41 has proven data transmission from radiosonde to receiver up to 350 km. Data availability during a sounding is guaranteed with digital error correction code transmission and telemetry errors are always detected. Due to narrower band transmission, more channels are available in the meteorological frequency band.

RS41 calibration

RS41 temperature and humidity sensors are calibrated against the references that are traceable to SI standards and measurement uncertainties are estimated according to recommendations of Joint Committee for Guides in Metrology, 100:2008.

Unwinder

With the unwinder the radiosonde sensor boom is automatically set in an ideal position for sounding. As the unwinder is separated from the radiosonde, you can prepare the balloon and unwinder in advance to streamline launch preparations.

Additional sensor connector

RS41 has a serial interface for additional sensors, primarily to connect ozone interface to RS41. You can also connect other sensors with XDATA protocol. The data is transferred either directly or through ozone interface to a RS41 radiosonde and further to Vaisala sounding system.

Features

- Superior PTU measurement performance
- Automated ground check
- Robust and easy-to-use design with informative LEDs
- GNSS for reliable wind data availability as well as height and pressure calculation
- Stable narrow band transmission complies with ETSI standard EN 302 054
- Unwinder pin for consistent sensor boom positioning

Technical data

Measurements

Measurement cycle	1 s
Temperature sensor	Type: Platinum resistor
Measurement range	+60 ... -95 °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 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	0.4 °C
Reproducibility in sounding ²⁾	> 100 hPa: 0.15 °C < 100 hPa: 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 -40 °C: < 10 s
Accuracy:	
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: Calculated from GNSS
Measurement range	From surface pressure to 3 hPa
Resolution	0.01 hPa
Accuracy:	
Combined uncertainty / Reproducibility in sounding ²⁾	> 100 hPa: 1.0 hPa / 0.5 hPa 100-10 hPa: 0.3 hPa / 0.2 hPa < 10 hPa: 0.04 hPa / 0.04 hPa
Geopotential height	Type: Calculated from GNSS
Measurement range ³⁾	From surface to 40 000 m
Resolution	0.1 gpm
Accuracy:	
Combined uncertainty in sounding	10.0 gpm
Reproducibility in sounding ²⁾	6.0 gpm
Wind speed	
Velocity measurement uncertainty ⁴⁾	0.15 m/s
Resolution	0.1 m/s
Maximum reported wind speed ³⁾	180 m/s
Wind direction	
Directional measurement uncertainty ⁴⁾	2 deg
Resolution	0.1 deg
Wind direction range	0 to 360 deg

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
3) In practice unlimited
4) Standard deviation of differences in twin soundings. Wind speed above 3 m/s for directional measurement uncertainty.

Telemetry

Transmitter type	Synthesized
Frequency band	400.15 – 406 MHz
Tuning range	400.16 – 405.99 MHz
Maximum transmitting range	Up to 350 km
Frequency stability, 90 % probability	±2 kHz
Deviation, peak-to-peak	4.8 kHz
RF compatibility	According to EN 302 054
Output power (high-power mode)	Min. 60 mW
Modulation	GFSK
Data downlink	4800 bit/s
Frequency setting	Wireless with ground check device
Authentication algorithm	HMAC-SHA256 ¹⁾

1) Requires Vaisala Cirrus Sounding System MW51

GNSS receiver

GNSS systems	GPS, Galileo ¹⁾ , BeiDou ¹⁾
Number of channels	≥ 48
Frequency	1575.42 MHz, L1 C/A code
Cold start acquisition time	35 s (nominal)
Reacquisition time	1 s (nominal)
Reporting resolution of lat, lon position values	1e-8°

1) Requires Vaisala Cirrus Sounding System MW51

Operational data

Power-up	Wireless or with switch
Factory calibration	Stored on Flash memory
Battery	2 pcs AA-size Lithium cells
Operating time	> 240 min
Weight	80 g
Dimensions (for cover, without wire antenna)	Body (L × W × H): 155 × 63 × 46 mm Sensor boom bent (L × W × H): 282 × 63 × 104 mm

Additional sensor support

Protocol support	XDATA
Transfer rate	Max. 200 bytes/s

Unwinder

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

The performance data is expressed with 2-sigma confidence level (k=2), unless otherwise specified. For humidity, the performance data is valid T > -60 °C.