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DATASHEET

RS41-SGP

Vaisala · Authorized Partner

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VAISALA

Radiosonde RS41-SGP



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

Features

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

RS41 PTU sensors

Vaisala Radiosonde RS41 temperature sensor uses linear resistive platinum technology and is stable. The small size of the sensor results in low solar radiation error and guarantees fast response. It effectively protects 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 compensates the effects of solar radiation in real time. 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.

The pressure sensor is a high-quality, shock-resistant capacitive silicon sensor providing height and pressure for meteorological messages.

All 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.

RS41 ground checks

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

Pressure measurement ground check is done by comparing and adjusting the pressure reading either against an optional barometer module installed inside the ground check device, or against an external precision barometer.

GNSS-based data

Wind is calculated based on GNSS satellite carrier frequency changes. GNSS-based height and pressure measurements are also available for research purposes.

Data transmission

RS41 has a proven data transmission range from radiosonde to receiver of 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.

Additional sensor connector

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

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 and combined uncertainty with k=2)	
Repeatability in calibration	0.1 °C
Combined uncertainty after ground preparation Combined uncertainty in sounding < 16 km Combined uncertainty in sounding > 16 km	0.2 °C 0.3 °C 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 and 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 and 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
Wind speed	
Velocity measurement uncertainty [3]	0.15 m/s
Resolution	0.1 m/s
Maximum reported wind speed [4]	180 m/s
Wind direction	
Directional measurement uncertainty [3]	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 for temperature and humidity
3) Standard deviation of differences in twin soundings. Wind speed above 3 m/s for directional measurement uncertainty.
4) In practice unlimited

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	84 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.

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