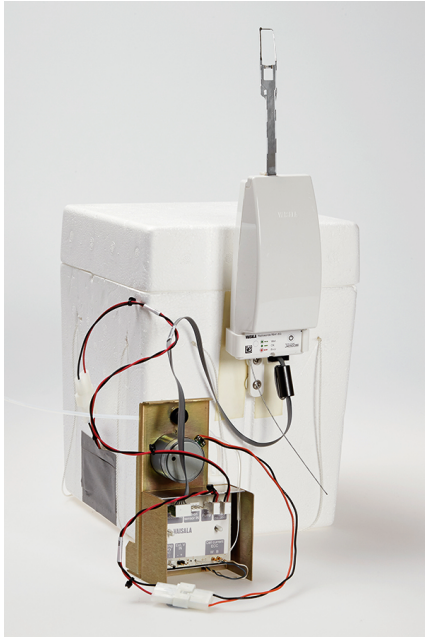


Ozone Sounding with Radiosonde RS41



Features

- Reliable and accurate ozone measurement for synoptic sounding and atmospheric research
- Sharp vertical resolution and a fast sampling rate
- An ozone interface kit is available for combining a RS41 radiosonde and ozone sensor
- Easy start for ozone sounding with automatic retrieval for many set-up parameters
- Prevention of ozone box freezing by heating with an additional lithium battery

The ozone sounding setup comprises an ozone sensor connected through an ozone interface to Vaisala Radiosonde RS41-SG or RS41-SGP. With Vaisala Ozone Interface OIF411 or OIF412, an ECC-type ozone sensor, and a digital RS41 radiosonde you can measure pressure, temperature, humidity, and geopotential height, as well as the vertical distribution of atmospheric ozone up to 3 hPa. Winds are measured using GPS navigation signals.

Ozone sensors

You can connect 2 ECC-type ozone sensors, Science Pump Corporation model ECC6AB and EN-SCI Model Z, to Vaisala Radiosonde RS41. The Science Pump Corporation ozone sensor is available through Vaisala. It measures ozone using the principle of iodide redox reaction to release electrons and is the most commonly used ozone sensor in the world today.

Ozone Interface Kit RSA411 and RSA412

Vaisala Ozone Interface Kit RSA411 and RSA412 are used for ozone sounding with Vaisala Radiosonde RS41 and an ECC-type ozone sensor. The kit is built around Vaisala Ozone Interface OIF411 or OIF412. The other peripherals in the kit include a radiosonde holder, cables for connecting the devices, a detainer for the radiosonde unwinder, and a stabilizer for use with certain parachute models.

Ozone Interface OIF411 and OIF412

Vaisala Ozone Interface OIF411 has 5 measurement channels and is powered by the radiosonde battery. Two channels are dedicated to the ozone sensor current and ozone pump temperature measurement, providing the data for ozone partial pressure calculation. OIF411 and OIF412 provide 2 diagnostic tools for the ozone pump. You can monitor battery performance with the pump voltage measurement, and pump performance with the pump motor current. These measurements are useful in verifying that the ozone sensor is functioning properly and that ozone measurements are valid.

There is also 1 channel for external voltage measurement that you can use freely for voltages from 0 to 12 V.

In very low ambient temperatures the liquid in the ECC cells may freeze during the flight, ending the ozone sounding before the radiosonde reaches important ozone layers in the stratosphere. To avoid this, OIF411 and OIF412 are able to control the heating of the ozone sensor box based on the temperature measured from the pump base. The heating is powered by an additional battery with a voltage range from 9 to 19 V. The recommended battery is a 9 V square lithium battery that you can easily fit onto the ozone sensor frame inside the ozone box.

OIF411 and OIF412 also have a serial interface for additional sensors, which can be chained, and the data transferred through OIF411 or OIF412 to a RS41 radiosonde and further to Vaisala Sounding System MW41.

Ground equipment

RS41-based ozone sounding is performed with Vaisala Sounding System MW41. The sounding system calculates the ozone partial pressure profile and integrated total ozone using raw ozone data and other radiosonde measurements. The sounding system offers also many useful features for ozone sounding preparation, data processing, and data messaging. The ozone data is automatically stored to enable post-ascent processing, and performing simulations is easy with the MW41 sounding software. System maintenance can be performed by Vaisala under the terms of a Vaisala Service Contract.

Technical data

Ozone Interface Board OIF411 and OIF412

| | |
|-----------------|---|
| For use with | Science Pump Corporation ECC6AB ozone sensor and EN-SCI Model Z ozone sensor |
| Synchronization | All channels are measured in synchronization with the meteorological measurements (pressure, temperature, humidity, wind) |
| Compatibility | Vaisala Radiosonde RS41-SG Vaisala Radiosonde RS41-SGP |

Ozone current channel

| | |
|---------------------------|------------------------------------|
| Ozone current measurement | 0–14 μ A |
| Combined uncertainty | 0.2 % of the reading, minimum 3 nA |
| Resolution | 0.1 nA |
| A/D conversion resolution | 16 bit |

Ozone temperature channel

| | |
|--|---------------|
| Ozone temperature measurement (specification fulfilment) | –5 ... +60 °C |
| Temperature measurement uncertainty ¹⁾ | 0.2 °C |
| Temperature measurement resolution | 0.01 °C |

¹⁾ Based on sensor specifications

Other functions

| | |
|--|--|
| Pump voltage measurement | 0–19.7 V |
| Pump voltage measurement uncertainty ¹⁾ | 1.5 % of the reading, minimum 0.1 V |
| Pump current measurement | 0–300 mA |
| Pump current measurement uncertainty ¹⁾ | 2.5 %, of the reading, minimum 3 mA |
| External voltage measurement | 0–12.0 V |
| Resolution | 0.1 V |
| Input resistance | 111 k Ω |
| Heating of the ozone box | Controlled by software |
| Heating battery voltage range | 9–19 V |
| Heating start temperature (at the pump) | +5 °C for OIF411 +9 °C for OIF412 |
| Heating stop temperature (at the pump) | +7 °C for OIF411 +9.5 °C for OIF412 |
| Operating temperature in ozone sounding | –90 ... +60 °C |
| Dimensions (L × W) | Max. 100 × 70 mm |
| Cable length | 380 mm |
| Weight with cable | Max. 50 g |
| Power consumption | < 50 mA (from radiosonde battery) |

¹⁾ 2-sigma (k=2) confidence level (95.5%) including uncertainties of the electrical components.

Additional sensor support

| | |
|------------------|---|
| Protocol support | XDATA to connect several sensors in the same chain, data transferred through OIF411 or OIF412 to RS41 |
| Transfer rate | Max. 200 bytes/s |

Technical information on ozone sensors

The technical specifications for the ozone sensors available through Vaisala are given by the respective manufacturers. The sensors have been used up to an altitude of 40 km or 3 hPa. The measurement time is limited to 2–3 hours due to evaporation of the sensor liquids. The temperature inside the ozone sounding (flight) box must be above 0 °C. For more information on the accuracy of a particular ozone sensor, contact Vaisala or the ozone sensor manufacturer directly.

Science Pump Corporation model ECC6AB ozone sensor

| | |
|---|--|
| Dimensions (including weatherproof ozone sounding flight box) | 191 × 191 × 254 mm |
| Weight (including battery) | 600 g |
| Operating temperature (inside ozone sounding flight box) | 0 ... +40 °C |
| Operating pressure | Ground level to 3 hPa |
| Storage, self-life, warranty | Two-year warranty from the day of delivery |

Compliance

| | |
|------------------|----|
| Compliance marks | CE |
|------------------|----|

Accessories and consumable items

Vaisala offers all the accessories and spare parts needed for ozone sounding. A start-up kit that contains everything you need to introduce ozone sounding to your upper-air sounding program is available. For more information on the start-up kit contact Vaisala.

Ozone sounding training

Vaisala offers training in ozone sounding. For more information, contact your Vaisala representative.

The performance data is expressed with 2-sigma (k=2) confidence level (95.5 %), if not otherwise specified.

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