Aerodyne Mini-TILDAS OCS/COS Monitor

Unprecedented precision and time response for OCS/COS measurements in a compact, transportable package.

Features:
- < 5 ppt 1-s precision
- < 2 ppt 100-s precision
- Fast time response (10 Hz)
- Direct measurement of OCS, CO\textsubscript{2}, H\textsubscript{2}O and CO in air without sample processing
- Dual laser package allows simultaneous measurement OCS and a variety of other molecules

Rugged, field-ready instruments

Direct absorption spectroscopy allows for highly specific and accurate gas detection

Mid-IR detection enables maximum measurement sensitivity

TILDAS Technology

Aerodyne instruments use tunable infrared laser direct absorption spectroscopy (TILDAS) at mid-IR wavelengths to probe molecules at their strongest “finger-print” transition frequencies. We further enhance sensitivity by employing a patented multi-pass broad-band absorption cell that provides optical path lengths up to 76 m. Direct absorption spectroscopy allows for fast (<1 sec) absolute trace gas concentrations without need for elaborate calibration procedures. Moreover, TILDAS instruments are free of measurement interference from other molecular species, enabling extremely specific detection.

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Aerodyne OCS Advantages

- Measurement precision comparable to much larger and more expensive IRMS instruments.
- Time response up to 10 Hz enables eddy covariance studies.
- Powerful TDLWintel software provides flexible instrument control, and real-time data analysis.
- Valve control capable of complex scheduling and automatic background and calibrations.
- 19" rack mountable for easy installation.
- Turn-key design allows unattended operation in remote field sites.

Applications

- Determination of atmospheric sources, sinks, and transport through OCS, CO\textsubscript{2} and CO.
- Biosphere exchange.
- Laboratory measurements of discrete samples.
- Mobile measurements aboard aircraft, marine, and ground-based platforms.
- Carbon capture and sequestration monitoring.
Performance Specifications:

COS/CO₂/CO/H₂O precision @ 2050 cm⁻¹ (1σ)

<table>
<thead>
<tr>
<th>Time Response</th>
<th>1 sec</th>
<th>100 sec</th>
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</thead>
<tbody>
<tr>
<td>COS</td>
<td>0.005 ppb</td>
<td>0.002 ppb</td>
</tr>
<tr>
<td>CO₂</td>
<td>100 ppb</td>
<td>25 ppb</td>
</tr>
<tr>
<td>CO</td>
<td>400 ppb</td>
<td>100 ppb</td>
</tr>
<tr>
<td>H₂O</td>
<td>5 ppm</td>
<td>2 ppm</td>
</tr>
</tbody>
</table>

Experimental spectrum acquired at 1 Hz

Instrument Components

- Core instrument
- Thermoelectric chiller
- Keyboard, mouse, and monitor
- Vacuum pump (customer specified)
- Inlet sampling system (customizable)

Size, Weight, Power

- Dimensions: 440 mm x 660 mm x 6U (267mm) (W x D x H)
- Weight: 35 kg (core instrument) + 15 kg (chiller) + pump weight
- Electrical Power: 250 W, 120/240 V, 50/60 Hz (without pump)

Data Outputs

- RS-232, USB drive, ethernet

Operation conditions

- Operating temperature: 10 to 35 °C
- Sample flow rate: 0 to 20 slpm

Installation

- 1-10 Hz data rate
- 0.05 s minimum Rise/Fall time (1/e)
- (depends on vacuum pump)
- 19” rack mountable or benchtop

REFERENCES:

Stimler, Keren, David Nelson, Dan Yakir; High precision measurements of atmospheric concentrations and plant exchange rates of carbonyl sulfide using mid-IR quantum cascade laser.” Global Change Biology doi: 0.1111/j.1365-2486.2009.02088.x


