

The fast-acquisition breath analysis configuration of the MAX300-LG was designed in collaboration with leaders in the field of respiratory research.

Breath Analyzer Features:

- **Quantitative Analysis** of O₂, CO₂, N₂, H₂O, and trace volatiles
- **Measurement Rates** up to 5 milliseconds per compound
- **Minimum Sample Flow** < 0.04 atm cc/sec
- **Sample Transit** as fast as 0.1 seconds

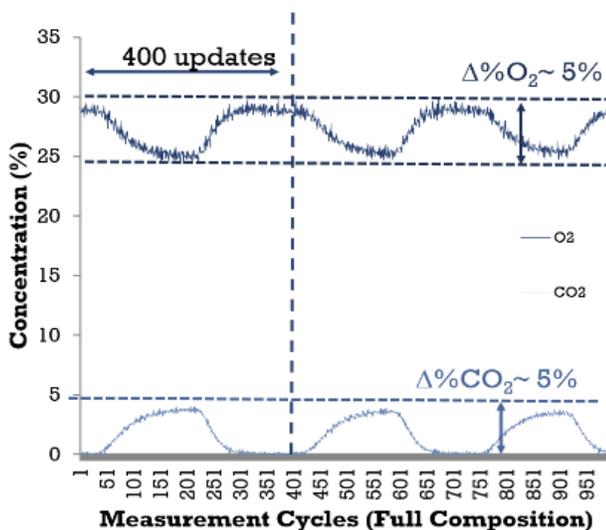


Figure 1. Mass Spectrometry for indirect calorimetry, a clinic patient inspiring 30% O₂ at a normal breathing rate. The MAX300-LG measures all compounds in the sample with 400 full updates per breath. From this data, metabolic parameters, like the respiratory quotient (RQ) can be calculated without the need for additional equipment to measure flow. O₂ and CO₂ measurements are shown, RQ=1 ± 0.007.



Figure 2. The MAX300-LG, laboratory gas analyzer, configured for the real-time quantitation of O₂, CO₂, N₂, H₂O, and trace volatiles within inspired and expired breath gas samples.

Reference:

1. Arieli, R. 2010. Mass Spectrometer for Respiratory Research. *Respiratory Physiology & Neurobiology*. 170, 183-184



Name	Min. Conc. (%)	Max. Conc. (%)	Det. Mass	STD (+/- ppm)
Water	0	2.5	18	54
Nitrogen	70	80	28	267
Oxygen	15	25	32	142
Argon	0.5	2	40	25
Carbon dioxide	0	10	44	40

Table 1. Typical MAX300-LG breath analysis performance. The mass spectrometer analyzes all compounds in the sample with very high precision. In addition to the components listed here, the analyzer has the flexibility to measure trace volatiles such as formaldehyde, acetic acid, ammonia, and hydrocarbons for the purpose of diagnostic evaluation.

$$RQ = \frac{CER}{OUR} = \frac{\left(CO_{2\ out} * \frac{N2_{\ in}}{N2_{\ out}} \right) - CO_{2\ in}}{O_{2\ in} - \left(O_{2\ out} * \frac{N2_{\ in}}{N2_{\ out}} \right)}$$

Equation 1. The Respiratory Quotient (RQ). Nitrogen is not absorbed during respiration, so the ratio of the volumetric % of N₂ in the inspired and expired sample is used to develop an RQ equation in which measured sample flow is not necessary. All O₂, CO₂, and N₂ terms above are measurements of volume %.

The sample inlet of the MAX300-LG is optimized for breath analysis. Configurations exist for sampling from high pressure (hyperbaric) conditions, or sub-atmospheric pressures, such as those found at high altitudes. Regardless of sample pressure, the inlet is designed to automatically adjust, and maintain peak analytical performance (Fig. 3).

The MAX300-LG, laboratory gas analyzer, features a fast acquisition software and inlet configuration designed specifically to produce the full breath-to-breath quantitative profile. It provides high precision measurements of all components in the breath sample, with up to 50 updates for each compound per second. The complete sample composition allows the researcher to calculate metabolic parameters, like the RQ, without the need for integrating additional flow measurements (Eq. 1).

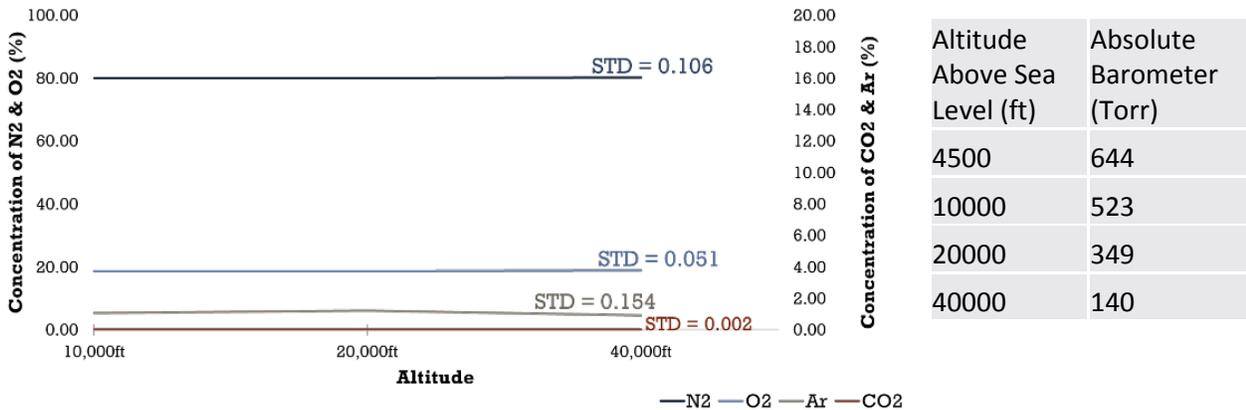


Figure 3. Air analysis at sub-atmospheric pressures. High altitude conditions were simulated at the MAX300-LG inlet. The system automatically adjusts and delivers uniform, high precision data regardless of sample pressure.

Replacement for MGA1100 and MGA1200.

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