

# HALO OK

## Trace-Level Oxygen Analyzer

GASES & CHEMICALS

CEMS

ENERGY

SEMI & HB LED

ATMOSPHERIC

LAB & LIFE SCIENCE

### Designed for trace-level oxygen analysis, the HALO OK offers:

- Industry-leading parts-per-trillion detection capability
- Unprecedented speed of response
- Wide dynamic range
- Absolute measurement (freedom from need for calibration gases)
- Low maintenance and cost of ownership
- Compact, portable package, ideal for both fixed and mobile cart installation
- Direct measurement in many matrices

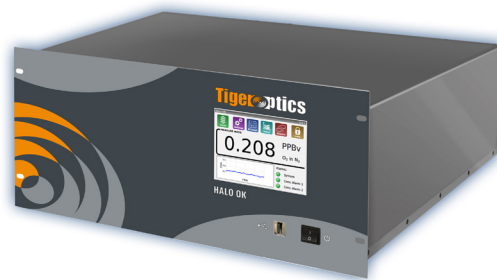
### Leading Choice for Ultra-high Purity Gas Users

Detect gas quality upsets before they damage your process. Using Tiger Optics' HALO OK oxygen analyzer, you can verify oxygen impurity levels with part-per-trillion accuracy, drift-free stability and instantaneous response. You'll find our system exceptionally easy and fast to install, and effortless to maintain, with built-in zero verification. Its robust design—free of moving parts—results in an analyzer that has a high Mean Time Between Failure (MTBF) rate and a very low Cost of Ownership (CoO).

With its patented catalytic conversion technique, utilizing a minute amount of hydrogen to cleanly and safely convert oxygen to moisture, the OK offers a fully laser-based solution for Continuous Quality Control of your process. Based on powerful Cavity Ring-down Spectroscopy, the HALO OK aligns with the SEMI F-112 standard for moisture dry-down characterization of gas systems. Pair the HALO OK with our HALO KA or HALO KA Max for ppt-level moisture measurement and enjoy the many advantages of profit-boosting CRDS technology for both critical contaminants.

# HALO OK

## Trace-Level Oxygen Analyzer



Performance	
Operating range	See table on next page
Detection limit (LDL, 3 $\sigma$ /24h)	See table on next page
Precision (1 $\sigma$ , greater of)	$\pm$ 0.75% or 1/3 of LDL
Accuracy (greater of)	$\pm$ 4% or LDL
Speed of response	< 3 minutes to 95%
Environmental conditions	10°C to 40°C 30% to 80% RH (non-condensing)
Storage temperature	-10°C to 50°C

Gas Handling System and Conditions	
Wetted materials	316L stainless steel 10 Ra surface finish
Leak tested to	1 x 10 <sup>-9</sup> mbar l / sec
Gas connections	1/4" male VCR
Sample inlet pressure	10 – 125 psig (1.7 – 9.6 bara)
Sample flow rate	0.5 to 1.8 slpm (gas dependent)
Sample gases	Most inert matrices
Gas temperature	Up to 60°C
H <sub>2</sub> supply requirements*	~15 sccm, 20 – 125 psig

\*H<sub>2</sub> supply (maximum 10 ppm H<sub>2</sub>O and O<sub>2</sub> impurity) is required for sample conditioning via catalytic conversion. For enhanced safety, a special model is available which uses a mixture of 3% H<sub>2</sub>/97% N<sub>2</sub> as an alternative to pure H<sub>2</sub>. See next page for detection performance specifications.

Dimensions	H x W x D [in (mm)]
Standard sensor	8.73 x 19.0 x 23.6 (222 x 483 x 599)
Weight	
Standard sensor	45 lbs (20.4 kg)
Electrical and Interfaces	
Platform	Max series analyzer
Alarm indicators	2 user programmable 1 system fault Form C relays
Power requirements	100 – 240 VAC, 50/60 Hz
Power consumption	450 Watts max.
Signal output	Isolated 4–20 mA
User interfaces	5.7" LCD touchscreen 10/100 Base-T Ethernet USB, RS-232, RS-485 Modbus TCP (optional)
Data storage	Internal or external flash drive
Certification	CE Mark

# HALO OK

## Trace-Level Oxygen Analyzer

### Standard Model (using pure H<sub>2</sub> utility gas)

Performance, O <sub>2</sub> :	Range	LDL <sup>†</sup> (3σ)	Precision (1σ) @ zero
In Helium	0 – 0.5 ppm	50 ppt	17 ppt
In Argon	0 – 1 ppm	90 ppt	30 ppt
In Hydrogen	0 – 2 ppm	150 ppt	50 ppt
In Nitrogen	0 – 2.5 ppm	200 ppt	70 ppt

### CO<sub>2</sub> Model (using pure H<sub>2</sub> utility gas)

Performance, O <sub>2</sub> :	Range	LDL <sup>†</sup> (3σ)	Precision (1σ) @ zero
In Helium	0 – 0.5 ppm	50 ppt	17 ppt
In Argon	0 – 1 ppm	90 ppt	30 ppt
In Hydrogen	0 – 2 ppm	150 ppt	50 ppt
In Nitrogen	0 – 2.5 ppm	200 ppt	70 ppt
In Carbon Dioxide	0 – 5 ppm	5000 ppt <sup>‡</sup> / 1000 ppt <sup>§</sup>	300 ppt

### Enhanced Safety Model (using 3% H<sub>2</sub>/97% N<sub>2</sub> mixture utility gas)

Performance, O <sub>2</sub> :	Range	LDL <sup>†,‡</sup>	Precision (1σ) @ zero
In Helium	0 – 0.5 ppm	400 ppt	17 ppt
In Argon	0 – 1 ppm	400 ppt	30 ppt
In Hydrogen	0 – 2 ppm	400 ppt	50 ppt
In Nitrogen	0 – 2.5 ppm	400 ppt	70 ppt

Contact us for additional analytes and matrices or information about our optional purged enclosure.

<sup>†</sup>LDL is dependent upon the quality of the sample gas and the integrity of the sampling system.

<sup>‡</sup>LDL is limited by minimum achievable O<sub>2</sub> concentration, not by 3σ baseline noise.

<sup>§</sup>LDL of 1000 ppt requires addition of Tiger Optics' [Zero Gas Panel](#) and [Linear Fit Mode](#). Please contact us for more information.

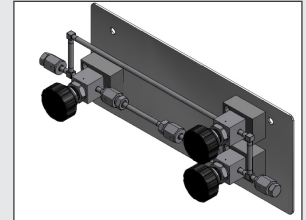
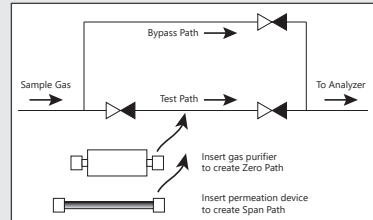
U.S. Patent # 7,277,177 · U.S. Patent # 7,255,836

## Optional Packages

Customize your HALO OK analyzer with these powerful add-ons:

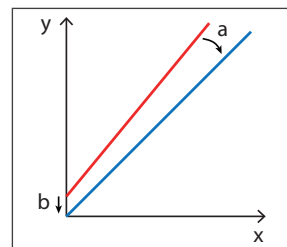
### Zero Gas Panel

- Inserting a purifier into the Test Path allows for verification of the analyzer's Zero Calibration
- Helps achieve lower detection limit in CO<sub>2</sub> in combination with Linear Fit Mode
- Spool pieces are included to allow insertion of purifiers with different lengths



### Linear Fit Mode

- Linear  $y = a x + b$  fit function permits user-defined calibration curves with programmable slope (a) and offset (b)
- Automatically adjusts readings to factor in dilution probes and sampling system offsets, while retaining absolute data
- Enables custom zero calibration for lower LDL in CO<sub>2</sub> in combination with Zero Gas Panel



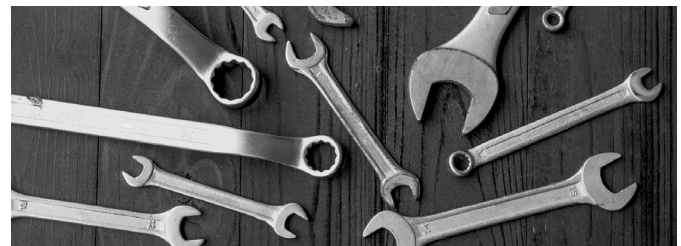
### Annual Performance Verification

- Low-cost and easy remote verification process, with no need to return the analyzer to the factory
- Annual verification by Tiger Optics ensures that your analyzer continues to meet its original specifications
- Up-to-date Verification Certificate to comply with your QA/QC standards



### Installation & Commissioning Package

- On-site analyzer installation and start-up by Tiger Optics trained personnel
- Ensuring correct installation helps prevent future issues with the analyzer or your sampling system
- Gain peace of mind and save money in the long run



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a Process Insights Brand

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