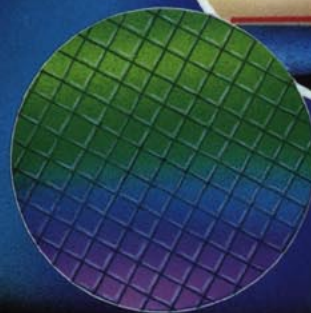
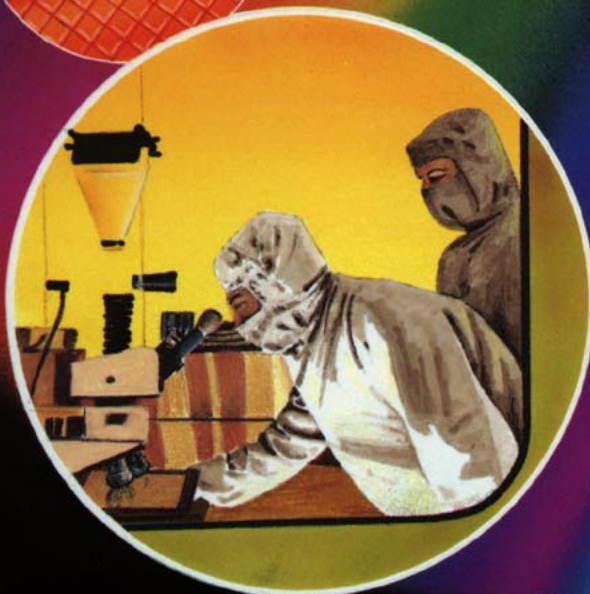


The World's Benchmark . . .

Parts-Per-Billion Oxygen Analyzer



 **TELEDYNE BROWN ENGINEERING**
Analytical Instruments

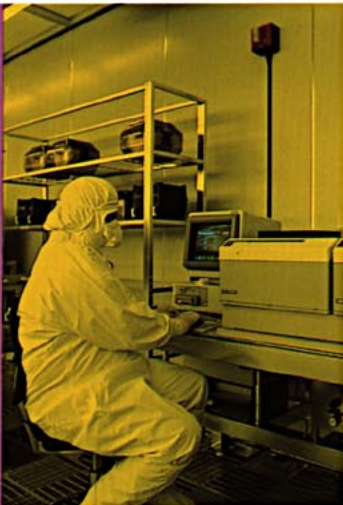
A NEW DIMENSION IN TRACE OXYGEN ANALYSIS

0.5 Parts-Per-Billion Sensitivity

Teledyne's Model 3060E Ultra-Trace Oxygen Analyzer represents a major breakthrough for highly accurate monitoring of the very low levels of oxygen contamination in ultra high purity process gases. This benchmark analyzer provides sensitivity of 0.5 ppb (500 ppt), 0.1 ppb resolution, excellent signal to noise ratio and long term stability. The excellent linearity over all four ranges of analysis precludes recalibration when changing ranges. "AutoRanging" feature allows fast, automatic range switching. Programmable auto zero/span at preselected intervals minimizes the user interface

Five user-programmable alarms furnish versatility to satisfy virtually any requirement. Quite simply, the Model 3060E is the most advanced, full-featured analyzer in the world for making real-time oxygen measurements at the low ppb levels.

In the manufacture of high-density microcircuits, trace oxygen contamination in high-purity gases can seriously limit yields and reduce profitability. Trace oxygen analyzers, therefore, play a crucial role in assuring the effectiveness of oxygen scrubbers and in the immediate detection of upset oxygen contamination. They are also vitally important for gas producers in the certification of their high-purity gases.



Fingertip Control

An embedded microprocessor provides direct interface to all functions through a color coded touch pad and large, easy-to-read, liquid crystal display (LCD) graphics. Start-up, calibration, alarm and range settings, and sample analysis are accessed via a menu-driven interface designed to guide the user through each function, making set-up and operation of the analyzer quick, simple and reliable.

Operator-initiated microprocessor controlled valves automatically select correct sequencing for any operating mode and prevent incorrect valve choice. Indicator light on the front panel flow diagram changes from red to green to inform the operator of closed/open status of the sample system valves.

Remote Control Capability

The user is able to fully control the Ultra-Trace Oxygen Analyzer from virtually anywhere in the world via modem and any computer. Use of either TRACS (Teledyne Remote Analyzer Control Software) or its Command Set allows the user to set zero and span, check or reset alarms, and monitor the output of the analyzer from a remote location.

Ultra-clean Sample System

The ultra-clean sample system has been constructed using techniques and components that meet the quality requirements for high-purity gas monitoring in the semiconductor industry. Electropolished 316L stainless steel tubing; VCR fittings; leakproof, bead-and-crevice-free orbital welds; minimal dead space; and metal bellows valves eliminate the possibility of gas absorption and trapping. Absolute sample system integrity is ensured by helium leak testing to a minimum of 10^{-9} std. cm^3/s . This superior construction eliminates any possibility that the gas sample will be contaminated in any way before it reaches the sensor.

Integral Calibration Gases

A built-in high efficiency scrubber furnishes oxygen-free zero gas, while an integral Faradaic calibrator produces an accurate span gas for precise calibration.

Automatic Protection of Built-in Oxygen Scrubber

An automatic shutoff protects the oxygen scrubber against high oxygen contamination in the event of a process upset or inadvertent introduction of high oxygen levels to the analyzer.

User-selectable Outputs and Data Lines

Two isolated 4-20 mADC and two non-isolated 0-1 VDC (negative ground) outputs are provided for both the oxygen measurement and range identification. A bi-directional RS-232C serial interface and a parallel printer port are also provided.

FEATURES

- ▼ 0.5 ppb (500 ppt) O_2 sensitivity
- ▼ 0-50 ppb O_2 low range
- ▼ Four linear ranges
- ▼ AutoRanging
- ▼ Manual range selection capability
- ▼ Easy, minimal maintenance
- ▼ Large red LED display with 1-inch numerals
- ▼ LCD graphic display and user-friendly operation
- ▼ Ultra-clean 316L stainless steel orbitally welded sample system
- ▼ Automatic sample system valve control
- ▼ Built-in oxygen scrubber
- ▼ Automatic oxygen scrubber protection
- ▼ Integral Faradaic calibrator
- ▼ Separate ports for sample and span gas
- ▼ Autozero and autospan calibration at preselected intervals
- ▼ Integral water reservoir, to enable analyzer to remain on-line year round



PATENTED* ULTRA-TRACE SENSOR EXPANDS THE BOUNDARIES OF OXYGEN MEASUREMENT TECHNOLOGY

Heart of the Model 3060E Analyzer is the exclusively engineered and patented* electrochemical sensor that utilizes the metal catalyzed gas diffusion electrode as the oxygen sensing element. This electrode generates an extremely high signal, compared to the conventional electrochemical sensors, even with very low levels of oxygen in the inert gases. Linear output from this revolutionary oxygen sensor allows calibration of the analyzer at the least sensitive range (for greater span accuracy) and still operate at the most sensitive range without the need for recalibration. The built-in correction factors for nitrogen, argon, helium and hydrogen allows the operator to change background gas without the need to recalibrate the analyzer.

Long-term Stability

Dissolved oxygen in the sensor electrolyte is continuously removed by sparging the electrolyte with an internally generated oxygen free zero gas, assuring a long-term stable zero. Excellent accuracy and stability are enhanced by using an integral mass flow controller (which eliminates the flow fluctuation due to sample gas pressure changes) and temperature controlled sensor compartment.

- ▼ Fast start-up
- ▼ Broader dynamic calibration range
- ▼ Front panel flow diagram with indicator lights to depict status of sample system valves
- ▼ Built-in correction factors for different gases
- ▼ Five user-programmable alarms
- ▼ User-selectable outputs
- ▼ 19-inch rack mounting

OPTIONS

- ▼ -100, 120, 220, 240 VAC (+10%, -13%), 50-60 Hz.
- ▼ -230 VAC (+15%, -10%), 50-60 Hz.

APPLICATIONS

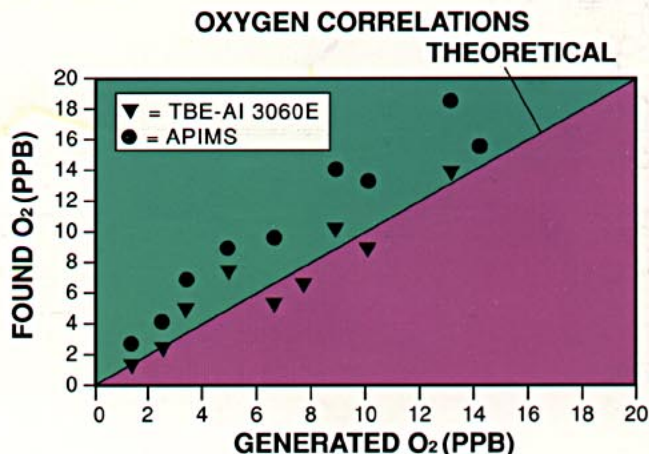
- ▼ Nitrogen (N₂)
- ▼ Argon (Ar)
- ▼ Hydrogen (H₂)
- ▼ Helium (He)
- ▼ Ethylene and other hydrocarbons
- ▼ Fluorocarbons
- ▼ Other inert gases



ACHIEVE AND SUSTAIN A COMPETITIVE ADVANTAGE

"Teledyne's newly developed and patented Ultra-Trace Oxygen sensor with its high surface area gas diffusion electrode provides exceptional accuracy, sensitivity, linearity and stability. Its use in the development of the Model 3060E has resulted in a product that is superior... to any other trace oxygen analyzer on the market."*

Right from the beginning, we were impressed by our test results. But we wanted to make sure we could get those same laboratory values in a true process environment. So we sent analyzers to various gas suppliers and semiconductor manufacturers for independent evaluation. The reports supplied to Teledyne reflect that the Model 3060E outperformed every other trace oxygen analyzer on the market with regard to long-term stability, linearity through all ranges, and extreme accuracy with a high signal-to-noise ratio. In laboratory tests, the Model 3060E showed excellent agreement when compared with Atmospheric Pressure Ionization Mass Spectrometry (APIMS).



Plot shows excellent agreement between the calculated oxygen concentration vs. experimental values obtained using the most sensitive range of the analyzer (0-50 ppb O₂ full scale).

Very Low Maintenance

During analysis, sample gas is exposed to the gas diffusion electrode. A portion of the sample gas diffuses through the gas wicks and reaches the catalyst layer contacting the bulk electrolyte. This mechanism of gas transport to the catalyst eliminates direct contact of bulk sample gas with electrolyte virtually eliminating the possibility of electrolyte contamination by the sub-micron particulates which may be present in the gas stream... providing uninterrupted, continuous on-line service without the need for dismantling the sensor for cleaning or replacing the electrolyte.

The sensor can operate continuously without losing its sensitivity, thus requiring virtually no maintenance.

* Patent No. 5,085,760

COMMITMENT TO QUALITY

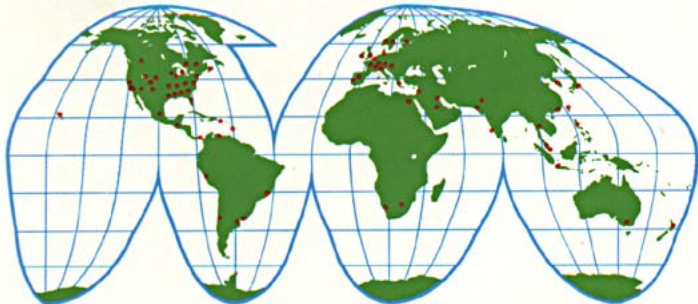
Teledyne products have long been recognized for their quality and reliability. Recognizing the increasing demands of today's global market, our strategic objectives focus on exceeding customers' expectations and profitable growth. Embracing the Total Quality Management (TQM) philosophy is a key strategy in improving the quality of goods and services delivered to customers.

Spectrum of Expertise: Meeting Today's Challenges

Teledyne is known for breakthrough technology. Our sensors, transmitters, analyzers and custom engineered systems incorporate a broad range of measurement technologies including electrochemical sensors, electrolytic moisture sensors, chemiluminescence, NDIR, near-infrared, ultraviolet/visible photometry, thermal conductivity, flame ionization, and catalytic combustion detectors. Many products satisfy standards or have approvals from FM, CSA, BASEEFA, CENELEC, PTB and other recognized agencies.

World Class Service and Support

Quality improvement is a continuous process established at each strategically located facility around the world to ensure that every product and after sales service we deliver represents the highest quality standards.



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Find out how Teledyne's breakthrough technological achievements will help you meet your need. For more information about the 3060E Trace Oxygen Analyzers or any of our other products, call or write to Teledyne Brown Engineering—Analytical Instruments or your local representative or distributor.

Representative/Distributor

TELEDYNE BROWN ENGINEERING Analytical Instruments

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committed to continuous Quality improvement

SPECIFICATIONS*

FOUR LINEAR RANGES (with AutoRanging):

- Range 1: 0-50 ppb O₂
- Range 2: 0-100 ppb O₂
- Range 3: 0-1 ppm O₂
- Range 4: 0-10 ppm O₂

A protective range of 0-30 ppm O₂ (This range is not accessible to the user. It provides overrange protection against high O₂ upsets.)

STANDARD BACKGROUND GASES:

Nitrogen, Argon, Helium and Hydrogen

ACCURACY:

± 2% of full scale at constant temperature

SENSITIVITY:

0.5 ppb (500 ppt) O₂ on low range with 0.1 ppb resolution

RESPONSE TIME:

90% of reading in 55-75 seconds

OPERATING TEMPERATURE RANGE:

+41° F to +104° F (+5° C to +40° C)

SIGNAL OUTPUTS:

For % of full-scale indication:

- one 0-1 VDC non-isolated signal, and
- one 4-20 mA DC isolated signal

For range identification:

- one 0-1 VDC non-isolated signal, and
- one 4-20 mA DC isolated signal

REMOTE OPERATION:

- with TRACS: IBM PC compatible computer connected directly or through Hayes compatible modem
- with COMMAND SET: Any computer with terminal emulation software, connected directly or through Hayes compatible modem

DATA LINES:

- one Centronics compatible parallel printer port
- one bi-directional RS-232C serial interface (provides two-way communication with separate host computer [PC] for remote monitoring and control of all functions)

ALARM OUTPUTS:

Five user-programmable absolute reading alarm setpoints and Form C SPDT relay contacts (3A resistive)

FLOW CONTROL:

Provided by Integral Mass Flow Controller
Nominal flow: Approx. 150 cc/min.

CALIBRATION GASES:

- Zero: Integral scrubber makes O₂-free zero gas
- Span: Integral Faradaic calibrator generates an accurate span gas (If preferred by the user, a span gas port is provided to accommodate use of a certified span gas.)

SAMPLE PRESSURE:

5-30 psig (0.35-2.1 kg/cm²g)

SENSOR:

Teledyne Ultra-Trace Cell
(U.S. Patent No. 5,085,760)

WETTED SURFACES:

316L stainless-steel system with electropolished wetted surfaces

CONNECTIONS:

1/4" VCR fittings

SECURITY:

User-programmable authorization entry code

POWER REQUIREMENTS (Worldwide AC input ranges):

- 100, 120, 220, 240 VAC (+10%, -13%), 50-60 Hz.
- 230 VAC (+15%, -10%), 50-60 Hz.

WEIGHT:

70 lbs. (31.8 kg)

MOUNTING:

19" relay rack (12.25" high x 18" deep) (31.11 cm high x 45.72 cm deep) - for general purpose (non-hazardous) area.

* Specifications/Features: vary with application; are established and validated during design; are not to be construed as test criteria for every product manufactured; and, subject to change without notice (rev. 6/93)