

A COMPLETE HARDWARE AND SOFTWARE SOLUTION FOR PROCESS TRACE OXYGEN ANALYSIS.

All the practical, user-friendly functions you need for efficient, reliable operation.

Teledyne's Model 3160 Trace Oxygen Analyzer combines a 0-1 parts-per-million (ppm) range with a powerful computer-aided, menu-driven environment that is ready made for remote data acquisition, analysis and control. Employing TRACS (Teledyne Remote Analyzer Control Software) or its Command Set, you can achieve hands-off control of your analyzer virtually anywhere in the world by means of a modem and any PC. You'll be able to access, display and manipulate parameters, statistics and diagnostic data. Simple, programmable security codes prevent unauthorized access to remote monitoring and control. Keyboard commands allow you to review historical data; set zero and span; calibrate; check or reset alarms; switch sensors; manage unmanned, unattended plants; and monitor the output. Quite simply, Teledyne's 3160 represents the most advanced, full-feature process analyzer in the world for measuring low levels of oxygen contamination in high-purity gases. It gives you more performance for the price than any other trace oxygen analyzer on the market.

Reliable, maintenance-free oxygen sensor.

Heart of the Model 3160 analyzer is Teledyne's proven Micro-Fuel Cell oxygen sensor enhanced by converting all analog signals to digital early in the processing cycle and stringent quality control of the manufacturing process. For reliability, sensitivity and accuracy while monitoring trace oxygen in the 0-1 ppm range, the Micro-Fuel Cell sets the industry standard.

Because the sensor is a sealed electrochemical device with no electrolyte to change or electrodes to clean, it is maintenance-free.

Output of the Micro-Fuel Cell is linear with respect to oxygen concentration in all background gases throughout all ranges.

Dual sensors and housings provide uninterrupted, continuous, on-line monitoring.

Teledyne's optional dual sensor housing provides two ready-to-use sensors completely installed and purged. Switching sensors is fast, foolproof and easily performed from the analyzer control panel or when in the remote mode. Operator-initiated commands instruct the microprocessor to activate valve sequencing so that the analyzer will switch automatically to a second preconditioned sensor. Following the calibration, your analyzer is ready for on-line service. Later on, at your convenience, the sensor taken off-line can be replaced without interrupting analyzer operation. Because each sensor is iso-

lated from the sample gas by pneumatically-switched valves, depletion of the off-line sensor is minimal.

The dual sensor housings also allow the operator a way to confirm upset conditions by switching sensors and re-checking the process.

AutoCalibration modular design and programmable intervals maximize value.

Precise AutoZero option for critical applications.

This microprocessor-controlled option is recommended for critical applications that require continuous monitoring of very high-purity gases in the 0-1 ppmO₂ range. Periodic AutoZeroing of the analyzer is user-programmable either locally or remotely using TRACS. The system operates to automatically sequence valves to precisely set a zero base line. Included is an oxygen scrubber which produces oxygen-free zero gas, eliminating the need for an external zero gas. For optimum performance and safety, the optional

FEATURES

- ▼ Embedded microcomputer (Intel 80188) with 128 kilobytes of ROM which is not affected by loss of power and 32 kilobytes of RAM requiring continuous battery voltage.
- ▼ Teledyne's proven Micro-Fuel Cell technology enhanced by converting all analog signals to digital early in the processing cycle and stringent quality control of the manufacturing process.
- ▼ TRACS (Teledyne Remote Analytical Control Software) when installed on a personal computer using modem or cable via the RS-232 serial port provides remote control and troubleshooting features designed exclusively for use in unmanned plants.
- ▼ Dual sensor housings (optional) isolated by pneumatically-switched valves designed for continuous on-line monitoring of unmanned plants.
- ▼ AutoCalibration features a modular approach for any application and budget. Periodic AutoZeroing and/or AutoSpanning of the analyzer is user programmable either locally or remotely using TRACS.
 - AutoZero (optional) system incorporates an oxygen scrubber and pneumatic valves for the highest possible accuracy.
 - AutoSpan automatically calibrates the analyzer using a predetermined span gas concentration.
- ▼ Cell output factor (span factor) indicates the relative life remaining in the cell.
- ▼ Dual displays for ease of monitoring and control of trace oxygen levels.
 - A red 4-digit light emitting diode (LED) display with one-inch numerals is easily read at a distance or even bright daylight.
 - A liquid crystal display (LCD) with user friendly menus and graphics capability serves as the control module and helps the user keep track of the current mode, any warning messages, instructions, button functions, alarm setpoints, ranges and system statistics.
- ▼ Data logger records past oxygen measurements and provides the documentation necessary for certification to today's ISO 9000 quality assurance standards.



scrubber utilizes an oxygen trapping media which is compatible with all major types of service: inert gases and saturated hydrocarbons; hydrogen; unsaturated hydrocarbons.

AutoSpan assures reliability while minimizing service requirements.

Periodic AutoSpanning of the analyzer is user-programmable either locally or remotely using TRACS. The system operates to automatically sequence valves to calibrate the analyzer using a predetermined span gas concentration. Separate sample and span gas ports allow the installation of an external source of span gas for calibration without interfering with the sample gas line. Cell output factor (span factor) indicates the relative life left in the cell ranging from 0.00 to 1.00. A span factor below 0.1 indicates that the Micro-Fuel Cell needs replacement.

- ▼ Six full-scale linear ranges of analysis from 1 ppm to 25%.
- ▼ AutoRanging automatically selects the appropriate range for a given reading.
- ▼ Programmable security passwords prevent unauthorized access to remote monitoring and control.
- ▼ Five user-programmable alarms with relay contacts
- ▼ System alarm (reconfigured fifth alarm) to monitor scheduled calibrator zeroing or a scheduled span calibration failure, RAM back-up battery failure, or an internal system failure.
- ▼ Electropolished 316L stainless steel sample system, orbital butt welds, computer controlled air actuated metal bellows valves with metal-to-metal seals.
- ▼ Separate sample and span gas ports allow the installation of an external source of span gas for calibration without interfering with the sample gas line.
- ▼ Four user-programmable analog outputs – two 4-20 mADC isolated and two 0-1 VDC non-isolated outputs.
- ▼ System power supplied from a power supply module designed to be compatible with any international power source.
- ▼ No recalibration of analyzer for change of background gas.
- ▼ Stainless steel cell block (optional).
- ▼ Industry standard 19" rack mounting – only 12-1/4 inch (31.36 cm) high.

APPLICATIONS

- ▼ Air separation and liquefaction
- ▼ Gaseous hydrocarbon stream monitoring
- ▼ Semiconductor manufacturing
- ▼ Protective atmosphere blanketing
- ▼ Process monitoring of gaseous monomers – vinyl chloride, propylene, butadiene, ethylene
- ▼ Gas purity certification
- ▼ Glove box leak detection
- ▼ Natural gas treatment and transmission
- ▼ Inert gas welding of exotic metals
- ▼ Heat treating and bright annealing
- ▼ Monitoring chemical reactions
- ▼ Industrial gas manufacturing
- ▼ Many other applications



USER FRIENDLY DISPLAY AND OPERATION.

Two displays are included with the Model 3160. One is a red, 4-digit LED display with 1 inch numerals that are easily read at a distance, even under conditions of bright daylight or poor ambient light. A second is a dot-matrix liquid crystal display (LCD) with graphics capability and function keys. The LCD serves as a centralized control station, allowing the operator to set and monitor setpoints, range, mode and system statistics.

All signal processing, input/output and display functions are controlled by an embedded microprocessor which automatically selects the correct valve sequencing for any operating mode.

Meeting the demand for quality assurance certification.

The microprocessor's data logger records and trends oxygen measurements at user-programmable constant intervals. The information is presented as a graphed chart or individual sample data point on the LCD. With a capability of 1,280 data points taken at constant user programmable intervals and available parallel printer port, the analyzer provides the documentation necessary for certification to today's ISO 9000 quality assurance standards.

Ultra-clean sample system prevents contamination.

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 with minimal dead space; and air-actuated metal bellows valves eliminate the possibility of gas absorption, trapping and dead legs. Sample system integrity is ensured by helium leak testing to 10⁻⁹ atm. cc/sec.

AutoRanging protects against incorrect range selection.

An AutoRanging feature automatically selects the range appropriate for a given measurement. Not only are you protected against an operator inadvertently selecting an incorrect range, you are assured of continuous on-scale monitoring regardless of the extent of an upset. If desired, a manual over-ride gives you the added flexibility of being able to lock-in a particular range of interest.

User-selectable analog outputs and digital data lines.

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

COMMITMENT TO QUALITY

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

Currently, the company is proactively pursuing the development, implementation and registration of a quality assurance system that meets recognized international standards commonly known as ISO 9000. The ISO 9000 standards have been accepted by over 90 countries and regulatory agencies within the world's major economic centers. To accelerate this process, Teledyne has entered into a fellowship with Digital Equipment Corporation to draw upon their tradition of quality and experience in successfully registering several facilities.

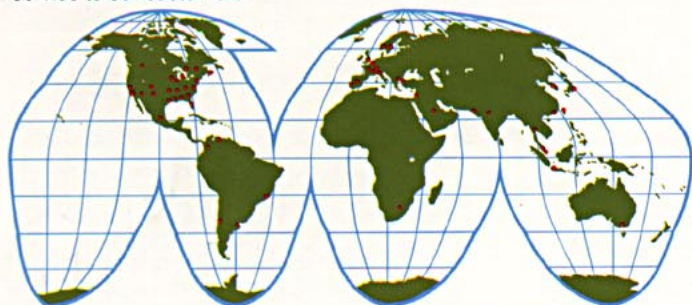
Quality improvement is a continuous process established at each facility around the world to ensure that every product we deliver and after-sales service represents the highest quality standards.

Spectrum of Expertise: Meeting Today's Challenges

Teledyne is known for breakthrough technology in oxygen analysis. We developed and patented the Micro-Fuel Cell for oxygen analysis more than 25 years ago. Since that time we have expanded our product offering to become a world leader in the development, system design, manufacture and distribution of equipment for monitoring the composition of gases and liquids for practically any industrial and medical application.

Sensors, analyzers and custom engineered systems incorporate a broad range of principles of measurement including parts-per-billion (ppb) oxygen analysis; electrochemical sensors; electrolytic moisture sensor; chemiluminescence; stack emission monitoring systems; NDIR, near-infrared and ultraviolet/visible photometers; thermal conductivity detectors; total hydrocarbon and flammable gas analyzers; transmitters and systems. Many of these products satisfy standards or other approval from FM, CSA, BASEEFA, CENELEC, PTB, TUV and other recognized agencies.

Supporting this spectrum of products requires a world-class customer service organization. Sales and technical service facilities have been strategically located around the globe to provide the highest quality of service to our customers.



Regional Offices: Houston, Texas - (713) 946-0270
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Find out how Teledyne's breakthrough analyzers can help you today. For more information about the Model 3160 Trace Oxygen Analyzer or any of our other products, call or write to Teledyne Brown Engineering Analytical Instruments or your local representative or distributor.

Representative/ Distributor

SPECIFICATIONS*

Six Linear Ranges (with AutoRanging):

0-1 / 0-10 / 0-100 / 0-1000 ppm and 0-1 / 0-25% O₂
AutoRanging covers all ranges.

0-25% range allows ppm over-range monitoring and air calibration. (Not recommended for 0-1, 0-10 ppm ranges).

Accuracy:

At constant temperature: $\pm 2\%$ full scale (except ± 0.1 ppm for 0-1 ppm range)

Over temperature range: $\pm 5\%$ full scale (except ± 0.15 ppm for 0-1 ppm range)

Four Signal Outputs (analog):

For % of full-scale indication:

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

For range identification:

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

TRACS (Teledyne Remote Analyzer Control Software) Operation

IBM PC-compatible computer; 300, 1200 or 2400 baud
Hayes-compatible modem; direct connection using null-modem cable.

Data Lines (digital):

- one Centronics-compatible parallel printer port
- one bi-directional RS-232C serial interface (provides 2-way communication with separate host computer (PC) for remote monitoring and control of all functions including oxygen analysis, calibration, diagnostics, alarm, etc.)

Alarm Outputs:

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

Response Time on Primary Range - at 77°F (25°C):

90% between 45 and 60 seconds (0-10 ppm)

Operating Temperature:

+32°F to +122°F (0°C to +50°C)

Calibration Gases:

A certified ppm O₂-in N₂ span gas may be used for span purposes.

Power Requirements:

Universal power entry module allows operation with 100, 120, 220, 240 VAC +10% -13%, 50-60 Hz.

Mounting:

19 inch relay rack (8 inch / 20.3cm high) for general-purpose (non-hazardous) areas

*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.

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