

TELEDYNE ANALYTICAL INSTRUMENTS



Model 3010M Paramagnetic Oxygen Analyzer

- *Advanced paramagnetic sensor with barometric pressure compensation and PID temperature control for enhanced stability*
- *Exceptional performance and price value*
- *Proven Teledyne microprocessor-based platform*
- *Designed for common air separation unit, medical air, and medical oxygen applications*

Teledyne's Model 3010MA Paramagnetic Percent Oxygen Analyzer is a versatile, microprocessor-based instrument specifically designed for oxygen purity analysis. The 3010MA is a precise, cost effective instrument capable of measuring percent oxygen in specific ranges as required by the air separation and medical gas qualification industries. Drawing on the solid performance of Teledyne's highly successful 3000 series control platform, the 3010MA provides the user with a wide variety of features while maintaining cost effectiveness.

PRINCIPLE OF MEASUREMENT

The physical property distinguishing oxygen from other gases is its paramagnetism that is significantly greater than that of other common gases. Consequently, the molecules of oxygen are attracted by strong magnetic fields -- a phenomena which can be used for detection purposes.

A paramagnetic sensor consists of two spheres arranged in the form of a dumbbell suspended in a symmetrical,

non-uniform magnetic field. When the surrounding gas contains oxygen, the dumbbell spheres rotate out of the magnetic field by the relatively strong attraction of oxygen.

A light beam focused on a mirror attached to the dumbbell reflects asymmetrically onto two photo diodes resulting in a voltage shift. The voltage difference produces a current used to drive the dumbbells back to the original position. The current flow required to maintain the null position is directly proportional to the oxygen concentration and is shown linearly in volume percent oxygen in the display. Properly maintained paramagnetic sensors last for years with little or no upkeep.

STABILITY BUILT-IN

Paramagnetic sensors, operating under suppressed, high-purity conditions, are natively subject to swings in their output based on changes in the surrounding barometric pressure. To properly compensate for such atmospheric pressure changes, Teledyne has incorporated an absolute pressure sensor in our system design.

In addition, to ensure an enhanced, stable performance, Teledyne maintains the paramagnetic sensor in its own isolated, heated compartment. A PID controller is used to properly control and maintain the temperature within the sensor compartment to optimize the analysis.

The analysis section is mounted directly beside the 3010MA control unit allowing for a panel-saving, single 19" rack mount configuration.

FLEXIBILITY

The 3010MA offers three dynamic, user-configurable ranges plus auto-ranging. The instrument is linear on all three ranges, eliminating the need to recalibrate while switching between ranges. The analyzer comes standard with an isolated 4-20 mADC output for oxygen concentration and range identification (optional).

Additionally, a bi-directional RS-232C serial communication interface provides for remote monitoring and control of span and zero functions. Teledyne provides auto-calibration capabilities as a standard feature in the 3000 series platform.

MODEL 3010MA PARAMAGNETIC OXYGEN ANALYZER

APPLICATIONS

- Air separation Bulk gas plants
- Medical air / medical oxygen qualifications

ADVANTAGES

- Linearity of analysis across three user-selectable ranges
- Temperature controlled / isolated sensor for long term stability
- Atmospheric Pressure Compensation for high-end, accurate performance
- Auto-ranging to follow process upsets
- Auto-calibration electronics standard
- Exceptional value at a favorable price

STANDARD FEATURES

- Proven, robust paramagnetic sensor
- Three user-selectable ranges plus cal range
- Signal output: isolated 4-20mADC
- Programmable auto-ranging
- Two fully adjustable concentration alarm set points with programmable relay functions, Form C contacts, 3A resistive
- Calibration contact span / zero, Form A normally open contacts, 3A resistive
- Self diagnostics with Form C failure alarm contacts
- Full duplex RS-232C communication link
- Five digit oxygen concentration LED display
- 2 x 20 alphanumeric vacuum fluorescent display for set up and diagnostics
- Switch selectable power supply:
90 - 130 or 200 - 240 VAC at 47 / 63 Hz
- Remote calibration digital inputs

SPECIFICATIONS

Ranges:	3 user selectable ranges of 95 - 100%, 96 - 100% and 98 - 100%; auto-ranging with ID output
Accuracy:	$\pm 0.045\%$ O ₂ absolute at constant temperature (once thermal equilibrium has been achieved) $\pm 0.05\%$ O ₂ over the entire operating temperature range (once thermal equilibrium has been achieved)
Response time:	90% of full scale in < 10 seconds at 77° F (25° C)
Linearity:	0.1% oxygen
Zero drift:	$\pm 0.5\%$ oxygen per month
Span drift:	$\pm 0.5\%$ oxygen per month
Repeatability:	$\pm 0.10\%$ oxygen
Operating temp:	68 to 86° F (20 to 30° C)
Outputs:	Two 0-1 VDC and two 4-20 mADC isolated (concentration and range ID)
Alarms:	1 x system-failure alarm contact to detect power failure; 2 x adjustable concentration threshold alarms with fully programmable set-points.
Analysis display:	5 digit red LED, 3/5" high numerals
Menu display:	20 character, 2 line vacuum fluorescent
Digital interface:	Full duplex RS-232C communications port
Power requirements:	90 - 130 or 200 - 240 VAC at 47 / 63 Hz (user selected on rear of control unit)
Oxygen sensor:	Long-life paramagnetic detector
Sample connections:	User specified 1/4" or 6 mm fittings
Area classification:	General purpose, indoor environment
Mounting:	19" rack mount
Dimensions:	8.7" H x 19" W x 12.23" L
Weight:	35 lbs (16 Kg)

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Warranty

Instrument is warranted for 1 year against defects in material or workmanship

NOTE: Specifications and features will vary with application. The above are established and validated during design, but are not to be construed as test criteria for every product. All specifications and features are subject to change without notice.

