PO Box 8067
The Woodlands, TX 77387
888-367-4286 (toll free)
281-367-4100
281-292-2860 (fax)
sales@detcon.com

detcon

Oxygen O2

Gas Detection

Electrochemical Sensor Technology

Oxygen *Deficiency and Process Monitoring*

detcon inc.

www.detcon.com

ISO 9001: 2000 • *Certified*

Catalog #O2-1204

Factory Testing
and Quality Assurance

Detcon Plug-In
Oxygen Sensor

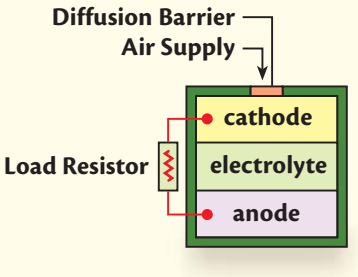
Description

Detcon O_2 gas sensor assemblies are designed to monitor for oxygen deficiency levels in ambient air or oxygen concentrations in process applications. The standard range for oxygen deficiency monitoring is 0-25% by volume and the ranges offered for process measurement applications span between 0-1% up to 0-30%. Detcon oxygen sensor technology is a field proven metal/air battery type electrochemical cell. As oxygen diffuses to the sensor interface, there is an electrochemical reaction that produces a current output proportional to the O_2 concentration. Typical service life is 2.5-3 years in ambient air. Complete sensor assemblies are offered in three explosion proof instrument packages. Model series DM-434, DM-534, and DM-634 offer a variety of features and are thoroughly detailed and specified in this data sheet. An Intrinsically Safe, Detcon Model DM-200, version as shown on the center page is covered separately in the Detcon DM-200 UniTox catalog.

Principle of Operation

Method of detection is by a controlled rate of diffusion. Oxygen first diffuses through a sintered stainless steel filter and then through the sensor's gas permeable diffusion membrane. At the sensor's electrode/electrolyte interface, oxygen is reduced and a corresponding current is generated between the cathode and anode electrodes. The lead anode is converted to lead oxide as current flows through the sensor. The current output is an exactly linear function of the oxygen gas concentration. The quick response of the sensor results in continuous monitoring of ambient air or process oxygen conditions.

Electrochemical Sensor



Why Choose the Detcon Oxygen Sensor?

There are a variety of sensor technologies suitable for the measurement and monitoring of oxygen gas concentrations. Included among the more common technology types are metal/air battery, two electrode non-depleting sensors, zirconium oxide and paramagnetic sensors. Each of the technologies offer certain advantages and can ultimately be an excellent choice for specific applications. The most common and most widely used technology is the metal/air battery type used in each of the Detcon instrument designs described in this product data sheet.

In general terms, Detcon oxygen sensor assemblies are designed for use in monitoring:

1. Ambient air for oxygen deficiency in the range 0-25 % by volume.
2. Measuring oxygen content in process applications over a variety of lower ranges of sensitivity.

Detcon oxygen sensor designs include several benefits that enhance the overall performance of this traditional sensor technology. Embedded temperature compensation and greatly improved sensor depletion control are two very significant features. These two very important advantages provide for better overall stability and performance as well as the extension of expected service life resulting in long term warrantees and lower cost of ownership. These advantages apply equally to ambient air monitoring and process measurement applications. Mechanical packaging of each of the sensor models is consistent with the Detcon trademark approach to delivering a completely field serviceable device wherein both the individual detectors and the control transmitter circuits are plug-in field replaceable.

Choosing the best sensor for an Oxygen monitoring or process measurement application involves consideration of a variety of factors... the range of sensitivity, the accuracy requirements, the maintenance requirements and the long term cost of ownership. Detcon sales engineers and sales representatives are trained and ready to thoroughly review field applications where needed and to provide timely and reliable support.

Highlights

- 2-year sensor warranty
- Embedded temperature compensation
- Exceptional stability in harsh environments
- Rugged electrical and mechanical design

Model DM-200-O2

UniTox™ Intelligent Sensor
Loop Powered 4-20 mA
Non-intrusive Interface

Detcon Model DM-200-O2 gas sensors use an intrinsically safe design to achieve their hazardous area approvals. Operator interface is via a hand-held magnet and program switches accessed through a fiberglass cover. Calibration instructions appear in simple script on a 2-line 16 character display. The transmitter is a universal design and can be mated with any O_2 intelligent sensor module (ISM). Upon connection, the ISM automatically communicates its identity, calibration history and historical logging information. This feature greatly enhances field serviceability.

- 2 wire loop powered operation
- Linear 4-20 mA output
- Non-intrusive user interface
- Universal Transmitter with Intelligent Sensor Modules
- Plug-in replaceable O_2 sensor
- 8 hour internal data logging capability

Request the Detcon UniTox™ catalog for more information on the Model DM-200-O2.

Model DM-434

Standard
4-20 mA Output
Loop Powered

Detcon Model DM-434 O_2 gas sensors are a traditional explosion proof sensor assembly with "blind" cover. Operator interface is via test points and span potentiometers accessed through the transmitter face plate. Detcon Model DM-434 sensors became commercially available in 1988. The most recent improvement was the conversion from a 3-wire to a 2-wire loop powered design. The plug-in modular packaging of the sensor transmitter circuit facilitates easy field level repair and upgrade of existing installations.

- 2 wire loop powered operation
- Linear 4-20 mA output
- One-man remote calibration
- Plug-in replaceable O_2 sensor
- Field upgradable to MicroSafe™ Intelligent Sensor assembly

Model DM-534

MicroSafe™ Intelligent Sensor
4-20 mA
Non-intrusive Interface

Detcon Model DM-534 O_2 gas sensors are non-intrusive intelligent sensors featuring Detcon Microsafe™ intuitive software. Operator interface is via a handheld magnet and program switches accessed through a glass lens cover. Calibration instructions appear in simple script on a16-character display. The sensor transmitter module is plug-in field replaceable which allows for easy field level repair and upgrade of any existing installation. DM-534 transmitters can also be used to upgrade existing DM-434 installations.

- Linear 4-20 mA output
- One-man remote calibration
- Plug-in replaceable sensor
- Self adjusting zero and span
- Sensor life indication
- LED indicators for Fault and Calibration status
- Non-intrusive, magnetic programming interface (via hand-held magnet)
- Simple menu-driven programming and calibration
- 16 character backlit alphanumeric display

Model DM-634

MicroSafe™ Intelligent Sensor
4-20 mA, RS-485, Relays
Non-intrusive Interface

Detcon Model DM-634 O_2 gas sensors are the most versatile of the 3 explosion proof O_2 sensor products. Model series 600 sensors provide complete flexibility in system integration options. Standard outputs include a linear 4-20 mA signal, three alarm relays and an RS-485 serial communication output. The intelligent sensor assembly features Detcon MicroSafe™ intuitive software. Operator interface is non-intrusive. All maintenance and programming functions are menu driven and accessed through a glass lens cover using a handheld magnet. The transmitter is packaged as a plug-in module which supports easy field level maintenance and repair.

- Linear 4-20 mA output
- RS-485 Serial Communications
- Field programmable alarm relays (3)
- One-man remote calibration
- Plug-in replaceable sensor
- Self adjusting zero and span
- Sensor life indication
- LED indicators for Fault and Calibration status
- Non-intrusive, magnetic programming interface (via hand-held magnet)
- Simple menu-driven programming and calibration
- 16 character backlit alphanumeric display

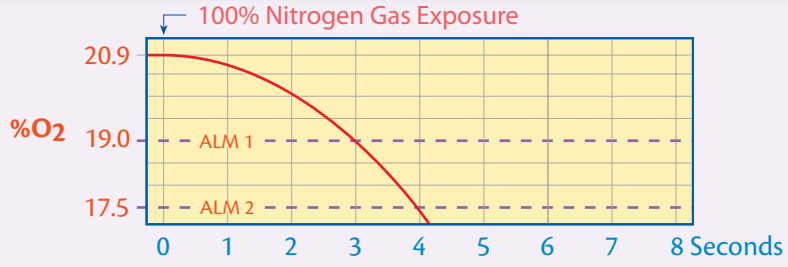
Technology Features

Field Replaceable Plug-in Components

The transmitter electronics module for each DM series O_2 sensor is a plug-in replaceable design which allows for rapid replacement or upgrade in the field. The O_2 sensor is modular and is also designed for quick and easy exchange.

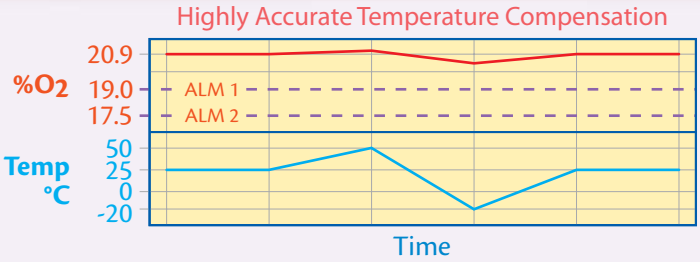
Rapid Response Time

Response to O_2 alarms is extremely rapid. O_2 deficiency alarms are reached in a matter of seconds. This level of response time performance is maintained throughout the service life of the O_2 sensor.



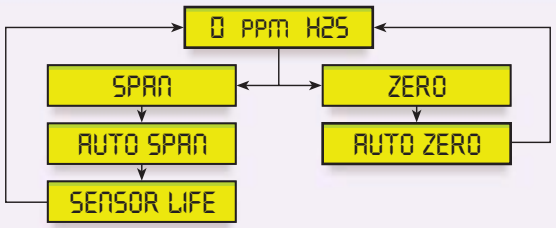
Exceptional Stability

Detcon O_2 Sensors feature highly accurate embedded temperature compensation located directly in the sensor module. When combined with industrially designed RFI rejection and superior long-term reading stability, the sensor remains free of false alarms for years at a time, even in the most harsh environments.



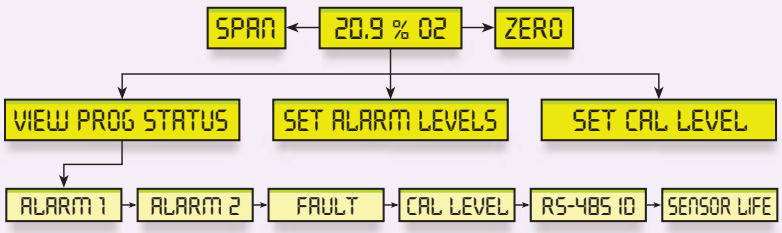
Simple Calibration (DM-534 & DM-634)

Span and zero calibration are sequenced automatically by the microprocessor, and require only 2 touches from the calibration magnet and 3 minutes time. The as-found reading and remaining sensor life are displayed during every span calibration.



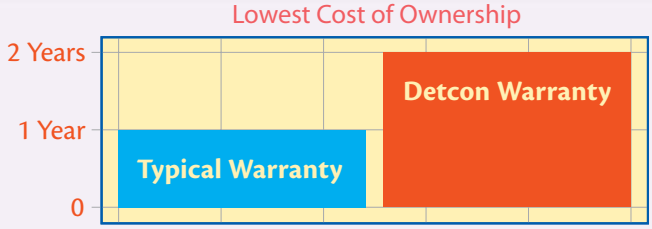
Intuitive User Interface (DM-634 Shown)

The user interface allows for adjustment of calibration gas value and alarm level set points. The "View Program Status" function displays all current set-point parameters for quick review.



Exceptional Warranty

Detcon offers an industry leading warranty of 2 years on all replaceable O_2 sensors. This warranty guarantees the lowest cost of ownership over the service life of the sensor. Detcon O_2 sensors routinely last up to 3 years under normal service conditions.

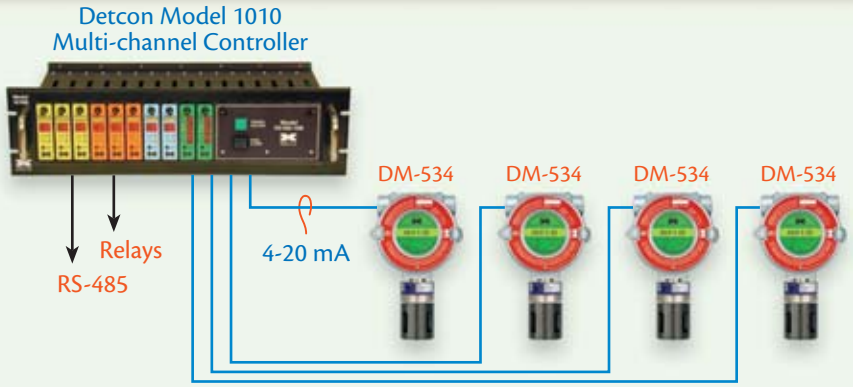


Integration Options

The DM Series of oxygen gas detectors provide the end-user with a wide variety of output options including 4-20 mA, RS-485 Modbus RTU, and relay contacts. As stand-alone devices, they are compatible with virtually any industry standard data acquisition system. Additionally, Detcon provides a complete range of pre-engineered gas detection systems. Shown below are a series of typical system integration approaches.

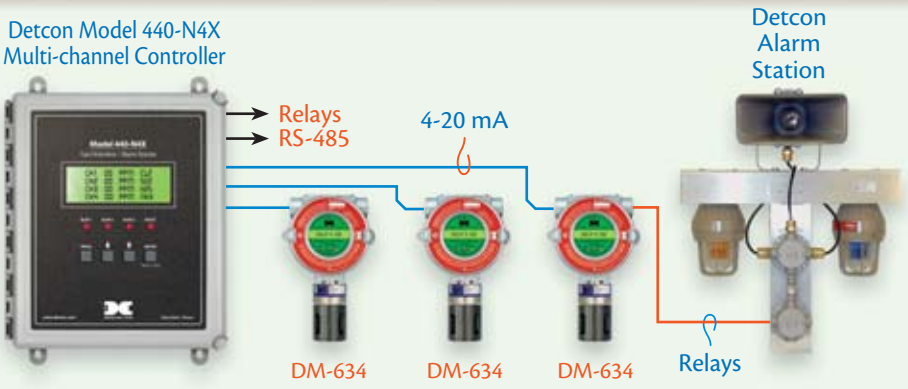
4-20 mA

Direct feed of individual sensor 4-20 mA outputs to dedicated Detcon multi-channel controller. The controller repeats outputs, and provides relay and RS-485 output options.



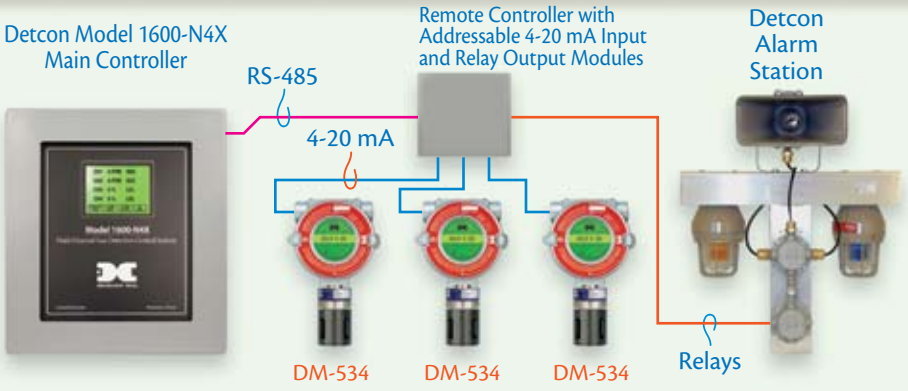
4-20 mA & Local Relays

Direct feed of 4-20 mA outputs to dedicated Detcon multi-channel controller is combined with direct wiring of built-in relay outputs (from Model DM-634) to activate field-mounted alarm stations or other response. Controller provides additional relay and RS-485 output options.



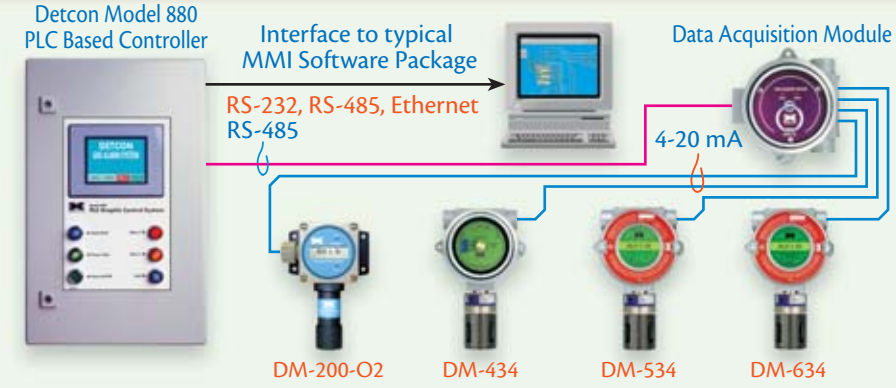
4-20 mA/RS-485 & Local Relays

Individual sensors (Model DM-534) provide 4-20 mA inputs to a remote-mount addressable 4-20 mA Input Module. The addressable 4-20 mA Input Module communicates via RS-485 to Model 1600 Controller. The remote-mounted addressable Relay Output Module provides signal for local alarm station. Detcon Model 1600 controller provides all data handling, display and historical logging.



4-20 mA & RS-485 Combination

Individual sensor 4-20 mA outputs are routed to Detcon DA-1 Data Acquisition Modules for conversion to RS-485. DA-1s are looped and fed to Model 880 PLC providing all data handling, display, and historical logging. The Model 880 then can be interfaced to a PC-based MMI using Citect, Wonderware, Cimplicity or other software package.



Order Guide

Model #	Description
DM-200-O2	UniTox™ oxygen gas intrinsically safe sensor assembly with 4-20 mA output
DM-434	Oxygen gas sensor assembly with 4-20 mA output
DM-534	MicroSafe™ oxygen gas non-intrusive sensor assembly with 4-20 mA output
DM-634	MicroSafe™ oxygen gas non-intrusive sensor assembly with 4-20 mA, RS-485, & Relays

Specifications

Sensor Type
Metal/Air Battery

Measurement Range
0-25% O_2
other ranges available

Accuracy
±2% FS

Repeatability
±2% FS

Response Time
T90 <20 seconds

Clearing Time
T90 <20 seconds

Linearity
±5% FS

Span Drift
<5% of signal per year (in first 2 years)

Operating Temperature Range
-4°F to +122°F; -20°C to +50°C

Operating Humidity Range
0-99% RH (non-condensing)

Input Voltage
11.5-30 VDC (DM-200-O2)
11.5-28 VDC (DM-434 & DM-534)
22.5-28 VDC (DM-634)

Outputs
Linear 4-20 mA DC
RS-485 Modbus™ (DM-634 only)
3 Relays (DM-634 only)
Alarm 1, Alarm 2, & Fault
Contacts rated 5 amps @ 250VAC, 5 amps @ 30VDC

Power Consumption (maximum)
<0.5 watts @ 24 VDC (DM-200-O2)
<0.6 watts @ 24 VDC (DM-434)
<1.5 watts @ 24 VDC (DM-534)
<2.1 watts @ 24 VDC (DM-634)

Electrical Classification
DM-200-O2
Class I; Div. 1, Groups A,B,C,D
EEx ia IIC T3C
DM-434, DM-534, DM-634
Class I, Division 1, Groups B, C, D

Safety Approvals
CSA/NRTL (US OSHA Certified)

Warranty
Sensor: 2 year conditional
Transmitter: 2 year

Sensor Weight/Shipping Weight
4 lbs/5lbs

Shipping Dimensions
12.5W" x 9.5D" x 8H"

Warranty

ELECTRONICS

5 Year Fixed Fee Service Policy

Detcon Inc. warrants each new control transmitter circuit to be free from defects in material and workmanship under intended normal use for a period of two years from the date of shipment to the original purchaser. Detcon, further provides for a five year fixed-fee service policy covering the control transmitter circuit. The fixed fee service policy shall affect any necessary factory repair for the period following the two-year warranty period and shall end five years after expiration of the warranty. All warranties are FOB the Detcon factory located in The Woodlands, Texas, USA.

O_2 PLUG-IN SENSOR

2 Year Conditional Warranty

Detcon Inc., as manufacturer, warrants each new oxygen plug-in sensor to be free from defects in material and workmanship under intended normal use for a period of 2 years under the following conditions: The warranty period begins on the date of shipment to the original purchaser and ends two years thereafter.

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