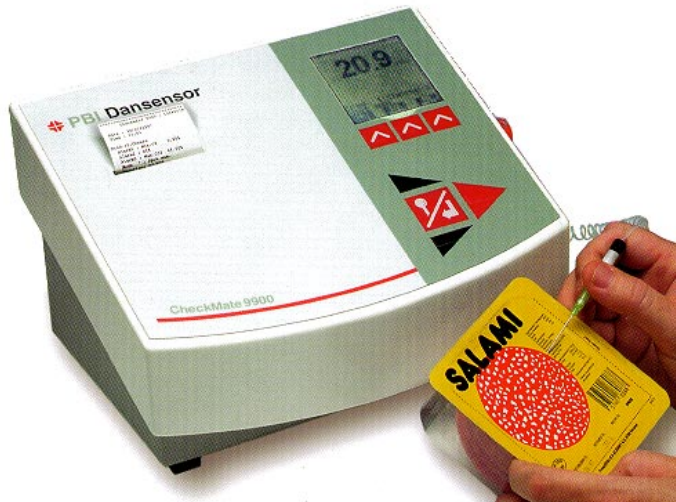


# Oxygen or Oxygen/Carbon Dioxide Headspace analyzer



## Introduction to the Checkmate

The PBI Checkmate is a sensitive oxygen / carbon dioxide analyzer designed for use with modified atmosphere packages. The instrument works by drawing a small sample of the headspace gas into a special zirconium detector. The analysis is very quick and the results are displayed on an LCD display within a few seconds. The Checkmate is self contained it includes everything you need for the analysis of MAP packages and includes an extensive range of features for ease of use, and ease of maintenance. A unique feature of the Checkmate is its ability to perform an analysis on only a very small sample of head space gas - even down to 1 ml for some pharmaceutical applications. This makes the Checkmate useful for almost all types of modified atmosphere packages.

## Automatic operation

The Checkmate has been designed for ease of use, - the measurement procedure is fully automatic, all the operator needs to do is to insert the needle through a septum into the head space of the package being tested. This automatically triggers the measurement cycle and produces a readout of oxygen concentration on the LCD display, on the printer and in memory. Other operating modes allow you to set up an analysis and start the measurement cycle at the push of button. The Checkmate also has a continuous mode of operation which will carry out a continuous analysis of an environment or gas stream.

## Sensitive, accurate and fast

The Checkmate is very fast. First of all its fast to warm up when first switched on, secondly the detector has an incredibly fast response time (50mS) and finally it is fast because it only needs a minute sample of gas to perform the analysis.

## Features

- Faster and more accurate than other head space analyzers*
- Measures Oxygen 0.001% to 100%  
Carbon dioxide 0 - 100%*
- Suitable for virtually all types of MAP/CAP packages needs only 1 - 2 mL (cc) of sample gas.*
- Completely automatic operation - no pre-cal, no set up*
- Built in alarms for low and high concentration*
- Alarm set up for up to 10 different products*
- Optional built in thermal printer.*
- Delivered ready to use.*
- Manual or automatic measurement.*
- Includes calibration certificate valid for 12 months*
- Clean, hygienic membrane keypanel*
- Robust industrial design ready for 7x24 work period.*
- RS232 included.*

## Automatic recording of test data

The results from each Checkmate analysis are automatically stored in memory and can be printed out on the built in printer or downloaded to a PC. Tests can be categorized by product type (or machine etc.). There are 10 categories built into the Checkmate which you can customize with names of your own.

## Calibrated and ready to use

The Checkmate comes ready calibrated, with a certificate of calibration, and only needs to be re-calibrated once a year. The operator never needs to worry about compensation for air pressure or flow verification because this is all taken care of automatically.

If you do want to re-calibrate the Checkmate yourself you can take advantage of the built in automatic calibration routine. This is a very simple two step process. Firstly you enter the concentration of your calibration gas into the menu. Then, whilst you are sampling the calibration gas with the needle, you instruct the instrument to calibrate to that gas. The rest of the procedure is done automatically by the microprocessor.

## Cans and Bottles

The checkmate can be used with a seal and pierce accessory for measuring the head space in all types of cans and bottles.

The test stand forms a seal to the can or bottle top and then the container is punctured so that the headspace sample can be drawn into the Checkmate for analysis.



## Principle of Operation

### Oxygen

The checkmate uses a proprietary miniature zirconium sensor. The sensor operates like a solid state battery which produces a small voltage or electro motive force (emf) in the presence of oxygen. This emf is directly related to the oxygen concentration of the gas being passed into the sensor. In fact the sensor has a characteristic curve that is very well defined so that if you know the voltage from the sensor you can figure out the oxygen concentration. This is done automatically by the electronics. The checkmate oxygen sensor is remarkably robust and stable, The readings are highly repeatable, and the sensor is very fast ( the response time of the sensor is of the order of 50 msec). Also the sensor will not saturate in the presence of high oxygen concentrations which means that the instrument can be used across a broad range of concentrations from 100 ppm to 100 % oxygen with great speed and accuracy.

### Carbon Dioxide

The CO2 sensor is a separate module to the oxygen sensor. The sensor is a self contained non dispersive IR sensor complete with IR source and wavelength filter. There are no moving parts and the sensor is very robust. The CO2 module can be added to a Checkmate O2 instrument as an upgrade.

## Data Collection for QA/QC

The optional built in printer provides a convenient record keeping tool for quality control. Individual measurements can be printed out as tests are made or stored in memory and printed in tabular form. The printout will show the oxygen concentration and tabulate the number of alarms levels exceeded in a particular batch of tests. You also have a record of time and date and can automatically figure out averages and other statistical data.

## CO<sub>2</sub> Upgrade

You can upgrade an oxygen Checkmate to a combined oxygen/carbon dioxide Checkmate at any time. Just order up the CO2 sensor and we'll fit it in the unit for you free of charge.

```

=====
      FOC-Sensor 48
=====
      Checkmate 9900 4677000
Time : 15:51
Date : 06-10-1997
Product no. 21 D4032
Alarm 1 : Max.O2 0.50%
Alarm 2 : Off 0.00%
Alarm 3 : Off 0.00%
Note : Spet. max.
Time/Date %O2 1 2 3
-----
06/10/1997
15:51:02 0.522 1
15:51:06 0.241
15:51:10 0.216
15:51:14 0.174
15:51:22 0.171
15:51:26 0.208
-----
Alarm counts 1 0 0
-----
Statistics
Total No. of measurements: 6
Alarm counts CO2
Alarm 1 : 16.7%
-----
Average = 0.272%
Max. = 0.522%
Min. = 0.171%
Std. deviation = 0.126%
    
```

## Specifications

Sensor Type - oxygen	Ceramic / Zirconium detector
Optional - carbon dioxide sensor	Infra Red detector
Measuring Range	0.001 % to 100% oxygen + 1 to 100% CO2 optional
Accuracy	1% of measurement (Oxygen) 2% or range CO2
Sample volume	2 ml
Display	3 digit LCD
Gain	Auto ranging
Weight	3 kg
Dimensions	290 x 250 x 180 mm

## Ordering Information

Model	Description	Part No
CMO2	Checkmate Oxygen analyzer	T970187
CMO2P	Checkmate Oxygen analyzer with built in printer.	T970187P
CMO2CO2	Combined Oxygen and Carbon Dioxide analyzer	T970260
CMO2CO2P	Combined Oxygen and Carbon Dioxide analyzer with built in printer	T970260P
CO2UP	CO2 detector upgrade for oxygen only checkmates	T260U

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