

## Application Note

### Residual Vial Headspace Oxygen

Shreedhar presents Model 905+ Pro for headspace oxygen measurements of pharmaceutical vials.

Many parenteral drugs are filled in glass containers like vials. Oxygen sensitive drugs need to be produced and filled with a low residual oxygen in the headspace of the container. Often a nitrogen overlay is used during the aseptic filling process.

Multiple Vacuum / nitrogen cycles are used for even lower residual oxygen levels. The GMP (Good Manufacturing Practice) regulations requesting a verification of the effectiveness of the process.

The instrument Model 905+ Pro enables an accurate and fast measurement of the residual oxygen in the headspace of the vial.

### Features

- Analyze oxygen in all types of vials and bottle
- Battery operated
- Range: 0.01% to 100% oxygen
- 7.0-inch capacitive touchscreen
- Built-in printer (2in. 48mm)
- Development accordance with GAMP guideline (21 CFR part 11 compliance with audit log and 3 level passwords system)

### Low Volume Sensor Design

The Model 905+ Pro sensor is designed specifically for this purpose. The oxygen sensor internal chamber through which sample gas flows, including all connecting tubing, has a very small volume of about 0.1 CCS. The sensor is located inside the instrument case close to the front panel to minimize tubing length and connects to the front panel fitting via 1 / 32 ID (.03 in.) inert tubing. The vent Port of the sensor connects to a short piece of narrow-bore tubing for sample exhaust and the introduction of zero or calibration gases.

### Design Reliability

Microprocessor-based electronics are used for sensor signal processing, battery charging, and on/off control to provide high accuracy and reliability. The heavy-duty, proprietary oxygen sensor is designed to provide many years of service, is sealed, and requires no maintenance. The sensor output is compensated for ambient temperature variations. The sensor can easily be changed if needed.

# Headspace O2 Analyser

## Model 905+ Pro



Headspace O2 Analyser  
Model 905+ Pro

The Model 905+ Pro measures oxygen levels in small or large pharmaceutical vials. Pharmaceutical preparations packaged in vials are often gas-flushed to provide a specific atmosphere in the vial, with defined levels of oxygen, nitrogen, or other gases. Depending on the product, these vials can range in size from 1 ml to 250 ml or larger. Small vials present some difficulty for oxygen analysis because the sample volume available is often quite small. A one ml vial, for example, may have only 0.5 ml of headspace gas. For direct analysis with an oxygen analyser, the instrument must be capable of analysing very small volumes.

### Calibration Simplicity

The oxygen sensor output is very linear through the entire range of measurement. This allows for a single-point calibration to be performed anywhere in the measurement range. Span calibration is accurately done by testing room air, which should give a reading of 20.9% oxygen. Calibration standards can also be used if required by in-house test procedures.

### Laboratory or Production Line

The Model 905+ Pro is a rugged benchtop unit housed in a heavy-duty medical grade ABS enclosure lightweight, well suited for continuous use in routine QC testing in the laboratory. With built-in battery operation in addition to the AC mode, this unit can be easily transported and used at remote locations such as the packaging line.

## Unit Operation

To test samples of vials or bottles, the sample must have a septum cap, aluminum seal, or thin plastic which can be punctured by a needle. Samples may be tested by three

- Water injection to force sample out of the vial. This method is used for all types of vials but is required for those with very small volumes, eg 1-2 ml.
- Sample withdrawal using an internal pump contained within the analyzer. This method is only useful for larger samples of 50 ml or more. (optional)
- Syringe suction at the sample vent to draw sample out of the vial.

The sample probe with a needle is used to puncture through the vial septum into the headspace of the vial. One of the three methods is used to withdraw sample gas into the analyzer for measurement. A stable reading is obtained in about 15 seconds.

## Calibration Adjustments

The factory Zero and SPAN adjustment is made using the soft key operation in the calibration menu no need for any potentiometer setting. Additionally, the Self-test for sampling room air should give a reading of 20.9%, It can quickly be set before prior test If internal laboratory procedures or regulations require checks with a known calibration standard, this can be used span gas cylinder instead of room air.



Headspace O2 Analyser  
Model 905+ Pro

## Test Report

Company Name; model number; Sr. No; Test time; Test is done by; Product name; Batch number; O2 concentration; Result, Acceptance limit; Printed by; Printed time;

## Audit Log

Logged Login, Logout, unauthorized attempt, create user, deactivate user, activate user.

## Residual Vial Head Space Measurement

Oxygen is the second leading cause of quality degradation of pharmaceuticals, water being the first, while we typically think of packaging as a primary resource used to protect drugs from the negative effect of oxygen. There are things to consider during drug development and manufacturing to make sure access oxygen isn't simply packed or bottled with the drug product

## Oxygen Sensitive Drug Product

Three are classes of drugs that are susceptible to adulteration from exposure to oxygen. They include most biologics, DEA schedule II and IV drugs, parenteral, and drugs that require an extended shelf life. Unintended oxygen exposure during production can set the conditions for quality degradation even though the drug may have passed all initial quality tests.

During research and development formulations must be tested and characterized for the long-term stability of the drug. Set Oxygen-sensitive product allowable exposure acceptance limit. There are ways to mitigate the impact and there are well-proven best practices that can be applied to manufacturing liquid fill-finish

The SI 905+ pro enables a measurement of the residual oxygen in the headspace



## User Interface

05-02-2020 12:10 50%

Enter login credentials

Login ID \*

Password \*

← →

q w e r t y u i o p  
a s d f g h j k l  
↑ ↓ z x c v b n m  
7123 , . ← →

Login screen



Main Menu

05-02-2020 12:10 50%

Report list

ID	Date and Time	User Name	Product Name	Batch No.	Oxy. Conc.	Result

← PAGE DOWN PAGE UP PRINT SELECTED REPORT

Report screen

05-02-2020 12:10 50%

Log list ALL

Date and Time	User Name	User Type	Activity

← PAGE DOWN PAGE UP

Log Screen

05-02-2020 12:10 50%

Create user

Create Username \* ADMIN

Password \*

Confirm Password \*

← →

q w e r t y u i o p  
a s d f g h j k l  
↑ ↓ z x c v b n m  
7123 , . ← →

Administration

Test Report

Company Name: SHREEDHAR INSTRUMENTS

OXYGEN ANALYZER

Model No.: 1080

Serial No.: 12345

Test Time: 16-02-2022 18:12:15

Test done by: Ketan

Product Name: t

Batch Number: g1

Oxygen Conc. (%): 20.73

Result: Fail

Acceptance Max. Limit (%): 5.00

Printed by: Ketan

Print Time: 17-02-2022 12:33:08

Authorized Signature

Report

	<b>Oxygen Sensor</b>
Type	Heavy Duty Proprietary Electrochemical
Range	0 to 100%
Sensitivity	0.01% O <sub>2</sub>
Resolution	0.01% O <sub>2</sub>
Minimum Detection Limit	0.01% O <sub>2</sub>
Accuracy	0.2% O <sub>2</sub> below 25% 1% of reading above 25%

Self - Test	Adjust the oxygen value 20.9% atmospheric (make sure sample the atmospheric air before self-test)
Calibration Controls	Touch screen operation ZERO and span adjustments for O <sub>2</sub> ;
O <sub>2</sub> Calibration	Weekly; set with room air set to 20.9% O <sub>2</sub> . Calibration can also be set with standard calibration gas.
O <sub>2</sub> Resolution	0.01% O <sub>2</sub>
Printing	Thermal printer 2" in. (48mm)
Sampling Port	Front panel fitting with screw connection for sample probe
Accessories	Low volume sample probe, three zero volume puncture needles, tubing & tee fitting, two plastic 1cc, and 5cc syringes, 115/240v ac to 12v dc power adapter
Battery	Sealed, rechargeable 10.6V Li-ion
Test Report	Company Name; model number, Sr. No; Test time; Test is done by; Product name; Batch number; O <sub>2</sub> concentration; Result, Acceptance limit; Printed by; Printed time;
Memory	16GB SD Card; Stored 500 Users and 20,000 Test reports
Activity log	Login, Logout, Unauthorized attempt, Create user, Deactivate user, Activate user,
Display Alarm	Low battery; Calibration due
Size	13.5W* 5.5H* 11.5L in. (344 * 142 * 292mm)
Weight	9 lb. (4Kg)
Warranty	One year.