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AMETEK

PRODUCT FAMILY BROCHURE

OX-TRAN®
OXYGEN PERMEATION ANALYZERS

Oxygen transmission rate testing for barrier films & packages.

OX-TRAN PRODUCT FAMILY

Introduction to OTR instruments

MOCON® Oxygen Permeation Analyzers are recognized as the industry-leading solution in oxygen transmission rate (OTR) testing. The extensive line of OX-TRAN® analyzers represents decades of technical leadership and continuous innovation in partnership with our customers, distributors and institutions. The family of OX-TRAN analyzers offer solutions for almost any OTR testing need, from sheet or barrier films to all types of packages, bottles, cartons and more.

FILM ANALYZERS

High and Ultra-High Performance

OX-TRAN 2/22 Series: A, H, L & 10X

- Most popular
- Most capability
- Low and ultra-low detection limit
- Wide range of testing application
- Films and package testing
- Interchangeable cartridges
- 2-cell models
- 1-cell models
- Testing to ASTM D3985

High Range

OX-TRAN 2/12 Series: R & T

- Wide test range
- Interchangeable cartridges
- Film testing only
- Affordable price
- 2-cell models
- Testing to ASTM F2622

High Throughput

OX-TRAN 2/28 Series: H & HR

- Double the testing throughput
- Simplified operation for QC labs
- Interchangeable cartridges
- Film and package testing
- Dry or humidified test gas
- 4-cell models
- Testing to ASTM D3985

WHOLE PACKAGE ANALYZERS

Package Testing

OX-TRAN 2/40 Series: H & L

- Controlled condition package testing
- Interchangeable testing cartridges
- Simplified package mounting
- Testing to ASTM D3985 & F1307

OX-TRAN 2/48 Series: H & L

- Ambient package testing
- Interchangeable testing cartridges
- Simplified package mounting
- Testing to ASTM D3985 & F1307

FEATURES OF MOCON ANALYZERS

Benefits

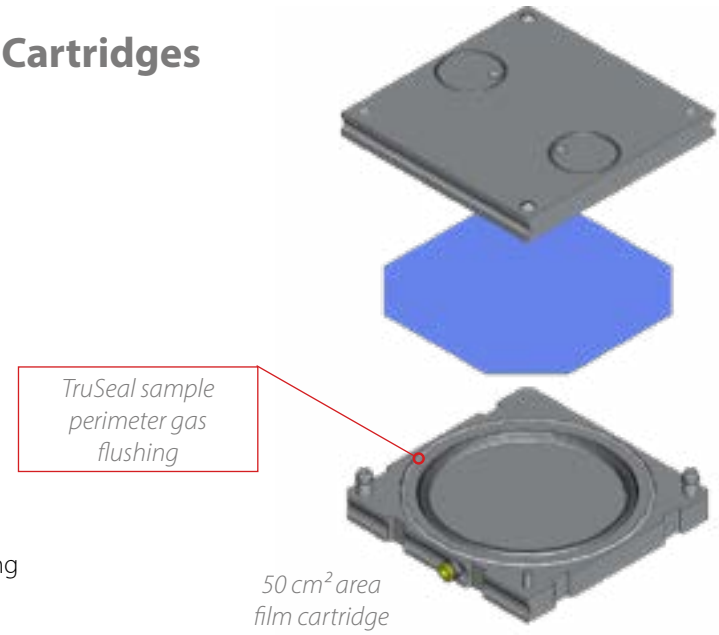
The advanced features on MOCON analyzers provide:

- High laboratory efficiency
- High repeatability
- Minimal training
- Wide testing capability
- Large dynamic range
- Variety of sample types

Removable & Interchangeable Test Cartridges

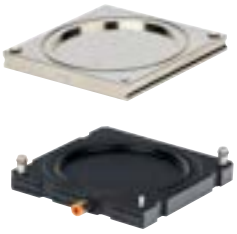
Removable cartridges use pneumatic clamp and TruSeal to provide repeatable results and benefits like:

- Expanded testing capability
- Easy bench-top preparation
- Reduced operator variability
- Reduced set-up time
- Improved accuracy
- Reduced reliance on masking
- Eliminated need for epoxy (for some cartridges)
- Reduced idle time by preparing samples in parallel to testing



FILM CARTRIDGES & ACCESSORIES

STANDARD



50 cm^2

REDUCED AREA — EXTENDED RANGE

1.3 cm^2

5.64 cm^2

10 cm^2

DUAL CELL CARTRIDGES

5 cm^2 x 2 Edge Effect

10 cm^2 x 2

5 cm^2 x 2

PAPER-BASED BARRIERS

5 cm^2 Edge Effect

5 cm^2 Edge Compression

50 cm^2 Edge Effect

10 cm^2 Edge Compression

BLISTERS, EYE DROPS & CONTACTS

Empty Blister

Pre-filled Blister or Eye Drops

Contact Lens

Application Examples

PACKAGE CARTRIDGES & ACCESSORIES

REMOTE PACKAGES OR FILMS

PackRack® Package Testing Fixture

Package Adapter

Package Mounting Fixture

High Temperature Film Test Cell

PACKAGE CARTRIDGES

Cartridges for use with
OX-TRAN 2/48, PackRack and OX-TRAN 2/40

Coffee Capsule

Flexible Pouch

Carton

Package Adapter

Standard 80 cm²

Vertical Tray

Capture Vessel

Test Chamber

OX-TRAN PERFORMANCE OVERVIEW

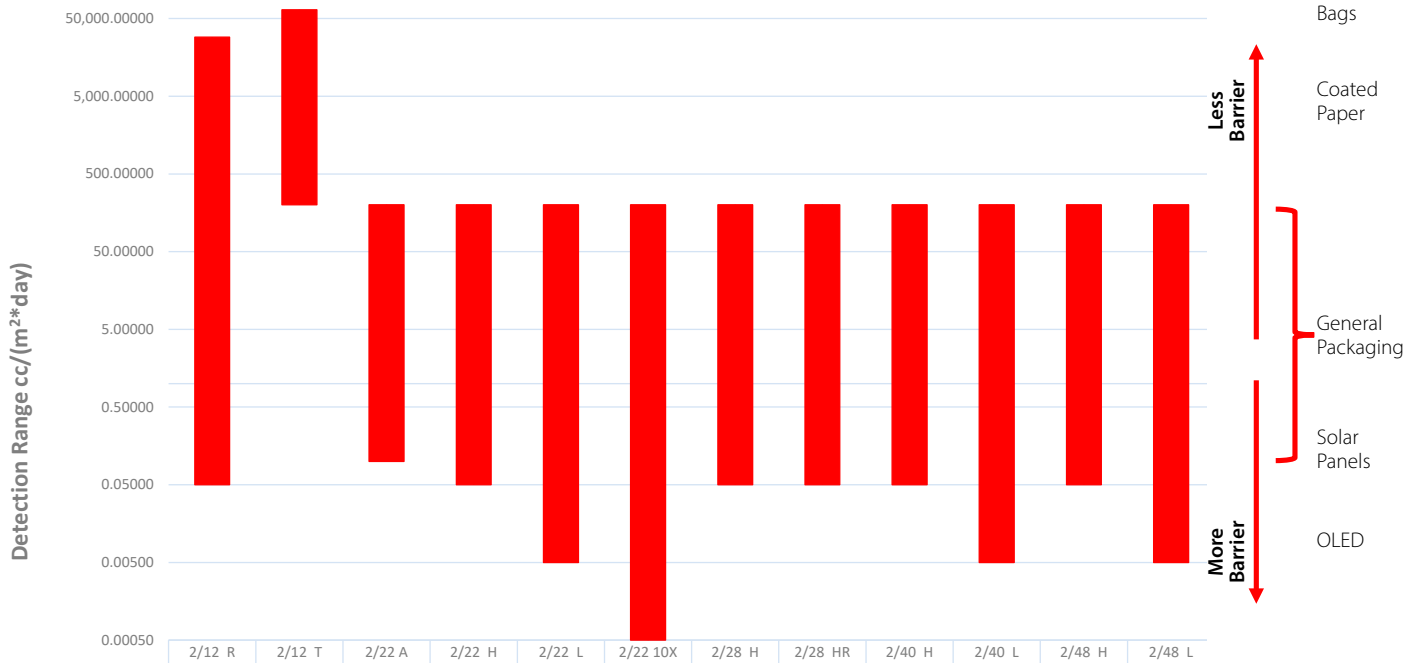
A Solution For Every Application

The OX-TRAN family offers a range of models to support your QC and R&D testing applications with the accuracy and repeatability you need. Our instruments are optimized for different applications such as packaging films, whole packages or other barrier types and are designed to be fit-for-purpose depending on your needs to provide the best efficiency and effectiveness.

OX-TRAN instruments feature our digital control system and automated testing, making them easy to operate and giving you the confidence of reliable results. The removable cartridge feature simplifies sample prep and offers expanded capabilities with a range of cartridge options.

Model	Primary Application	Test Cells	Sample Type
OX-TRAN 2/12 R	Wide-range R&D	2	Film
OX-TRAN 2/12 T	High-range R&D and QC	2	Film
OX-TRAN 2/22 A	Limited-range R&D and QC	1	Film & Package
OX-TRAN 2/22 H	Normal-range R&D and QC	1 or 2	Film & Package
OX-TRAN 2/22 L	Low-detection R&D	2	Film & Package
OX-TRAN 2/22 10X	Ultra-low-detection R&D	2	Film & Package
OX-TRAN 2/28 H	Normal-range QC	4	Film & Package
OX-TRAN 2/28 HR	Normal-range QC with RH test gas	4	Film & Package
OX-TRAN 2/40 H	Normal-range R&D and QC	4	Package & Film
OX-TRAN 2/40 L	Low-detection R&D	4	Package & Film
OX-TRAN 2/48H	Normal-range R&D and QC	4+4	Package & Film
OX-TRAN 2/48L	Low-range R&D and QC	4+4	Package & Film

OX-TRAN Detection Range Comparison



	2/12 R	2/12 T	2/22 A	2/22 H	2/22 L	2/22 10X	2/28 H	2/28 HR	2/40 H	2/40 L	2/48 H	2/48 L
Low detection Limit	0.05	200	0.1	0.05	0.005	0.0005	0.05	0.05	0.05	0.005	0.05	0.005
Upper detection Limit	28,800	65,000	200	200	200	200	200	200	200	200	200	200

MOCON Exclusive COULOX® Sensor

This patented sensor from MOCON is an absolute (intrinsic) coulometric sensor that requires no calibration and is the basis for ASTM standard D3985. Our OX-TRAN family of oxygen permeation analyzers are the only instruments proven to meet the precision and bias requirements of ASTM D3985 through independent third-party testing.

COULOX Sensor Advantages

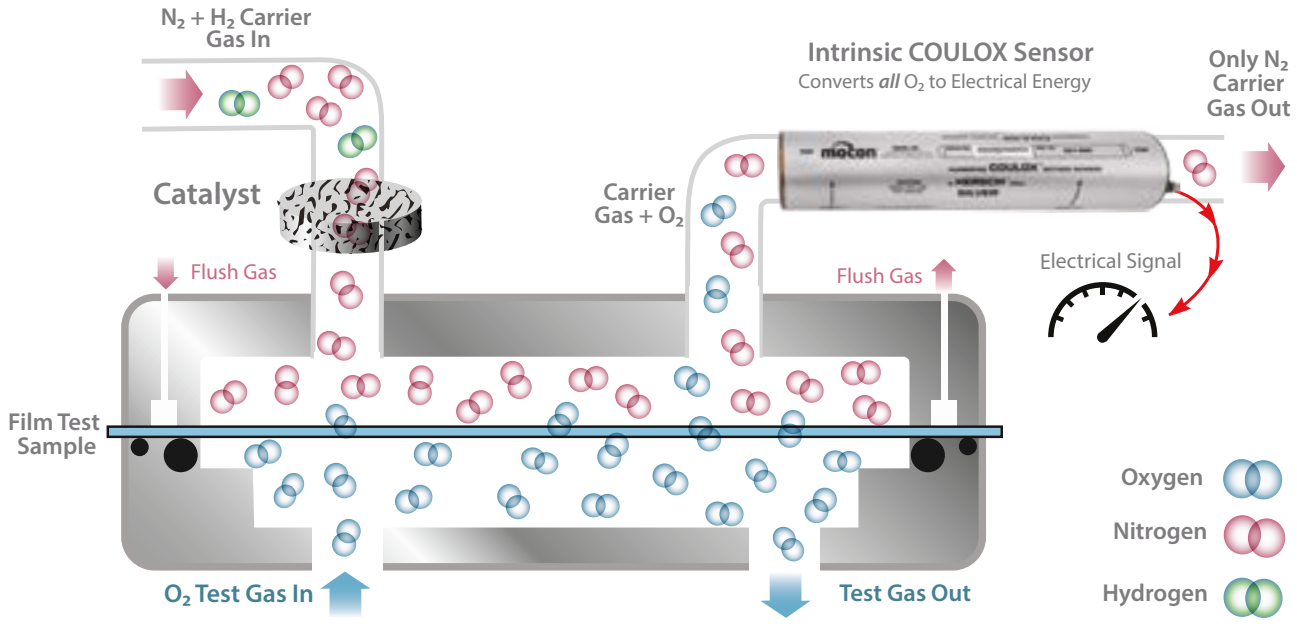
- Longest life
- Absolute OTR detection with no calibration
- Only sensor that fully complies with ASTM D3985
- Proven accuracy and repeatability

Comparison of COULOX Sensor and Other Industry Sensors

	ASTM D3985 Standard	MOCON COULOX Sensor	Other Coulometric Sensors
Coulometric Reaction in Sensor	Required	Yes	Yes
Carrier Gas Analyzed by Sensor	100% required	100%	Only partial flow swept to sensor
Sensor Calibration	Not required	Not required	Required due to variable flow rate
Intrinsic Sensor	Required	Yes	No
Mixed N_2/H_2 carrier gas	Required with catalyzer for clean background	N_2/H_2 used with catalyzer	Use 99.999% UHP N_2, no catalyzer, Results = 1 ppm O_2 allows 2.8 cc/m^2 • day OTR background
Full Compliance to ASTM D3985		Yes	No

MOCON COULOX Sensor - More Than Just Coulometric

Only MOCON COULOX sensors analyze 100% of carrier gas (and are therefore intrinsic), use catalyst and fully comply with ASTM standard D3985. They are not affected by temperature, flow rate or barometric pressure or the 1 ppm O_2 in UHP N_2.



Fully Digital Testing Simplifies Operation

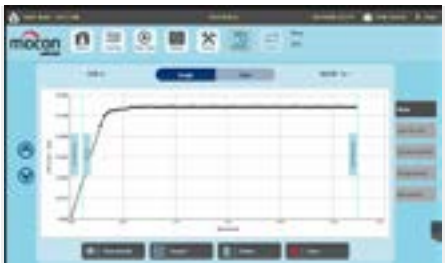
Digital testing provides industry-leading accuracy and repeatability by limiting operator variability. Our easy-to-use control system features fully automated digital testing, including controls for temperature, gas flow, and relative humidity. Final test reports are automatically saved, and can be set to print and export by default.

New

WinPerm™ 2.5 on Windows® 10 OS for

- OX-TRAN® 2/22

Auto-test mode automatically adjusts the testing parameters to provide results for unknown samples



Advanced-test mode is the most commonly used and is for specific parameters and conditions

Sequential testing allows a series of tests to be performed on the same samples at different test conditions

PermWare®

Our permeation laboratory management software was designed to improve efficiency and simplify data handling. In addition to simplifying compliance, PermWare provides benefits like:

- A master data collection system for all MOCON permeation instruments
- The ability to store, sort and manage all permeation test reports in one location
- A convenient dashboard operations screen for all Next Generation Instruments
- Windows® 10 compatibility on desktop computers
- A safe connection to secure networks

PermWare Network can connect all of your MOCON instruments, printers and external network

Windows® is a registered trademark of the Microsoft Corporation.

Overview screen for all Next Generation Instruments

Access test reports from any MOCON Instrument

OX-TRAN PORTFOLIO OVERVIEW

Package Testing Overview

The OX-TRAN family of package testing analyzers offer OTR testing from high to ultra-low levels of detection. Purpose-built for efficient and accurate package testing using our revolutionary cartridges, they can also test films, barrier sheets and more.

Feature	OX-TRAN 2/40 H	OX-TRAN 2/40 L	OX-TRAN 2/48H	OX-TRAN 2/48L
Sensor Type	Absolute COULOX	Absolute COULOX	Absolute COULOX	Absolute COULOX
OTR Range* @ 20.8% O_2 ($cm^3/(m^2 \cdot day)$)	0.05 to 200	0.005 to 200	0.05 to 200	0.005 to 200
OTR Range @ 20.8% O_2 ($cm^3/(pkg \cdot day)$)	0.00025 to 1.0	0.000025 to 1.0	0.00025 to 1.0	0.000025 to1.0
Cells	4		8 (4+4)	
Minimum sensor exam time per cell (minutes)	30	45	15	30
Repeatability ($cm^3/(pkg \cdot day)$)	±0.0001 or 1%	±0.00001 or 1%	±0.0001 or 2%	+/- 0.00001 or +/- 2%†
Test temperatures (°C)	10 to 50 ± 0.5		Ambient	
Controlled RH Test Range (%)	5 to 90 ± 5		Ambient	
Carrier Gas RH Test Range (%)	0 to 90 ± 4		Dry or 30 to 90 ± 5	
Industry standards	ASTM D3985, ASTM F1927, ASTM F1307, ASTM F2622, ISO 15105-2, JIS K 7126-2, DIN 53380-3			
Approximate sensor life** (yr)	4			
Sensor warranty (yr)	4 pro-rated			
Film testing capability	Yes			
Cartridge options	Multiple package testing options, Integrated package testing options, Film			
Automation	Automatic testing, advance test mode, auto-test mode, sequential testing, auto purge, auto conditioning			

* Using Standard 50 cm^2 film cartridge
** Based on 80% usage
† or reading/degree C change in ambient whichever is greater

OX-TRAN PORTFOLIO OVERVIEW

Film Testing Overview

The OX-TRAN family of film testing analyzers offer OTR testing from high to ultra-low levels of detection. Purpose-built for efficient and accurate film testing, many can also test for additional applications such as packages, bottles, cartons and more.

Feature	OX-TRAN 2/12 T	OX-TRAN 2/12 R	OX-TRAN 2/22 A1	OX-TRAN 2/22 H1
Sensor Type	T-Mod COULOX	Coulometric	Absolute COULOX	Absolute COULOX
OTR Range* @ 100% O_2 ($cm^3/(m^2 \cdot day)$)	200 to 65,000	0.05 to 28,800	0.1 to 200	0.05 to 200
OTR Range* @ 100% O_2 ($cm^3/(100in^2 \cdot day)$)	12.9 to 4200	0.003 to 1858	0.006 to 12.9	0.003 to 12.9
OTR Range @ 100% O_2 ($cm^3/(pkg \cdot day)$)	1.0 to 323	0.00025 to 144	0.005 to 1.0	0.00025 to 1.0
Cells (Qty x Size cm^2)	2 x 50 cm^2		1 x 50 cm^2	
Minimum sensor exam time per cell (min)	15	45	15	
Repeatability ($cm^3/(m^2 day)$)	±25 or 1%	±0.05 or 1.5%	±0.02 or 1%	
Test temperatures (°C)	10 to 35 ± 0.2	10 to 40 ± 0.2	20 to 40 ± 0.2	
Carrier and/or Test Gas RH range	Dry	Dry or 5 to 90% ± 3	Dry or 5 to 90% ± 3	
Industry standards	ASTM F2622, ISO 15105-2, DIN 53380-3		ASTM D3985, ASTM F1927, ASTM F1307, ASTM F2622, ISO 15105-2, JIS K 7126-2, DIN 53380-3	
Approximate sensor life** (year)	3	1	4	
Sensor warranty (year)	1		4 pro-rated	
Max barrier thickness mil (mm)	120 (3.0)		120 (3.0)	
Package testing capability	No		Yes	
Cartridge options	50 cm^2; Reduced Area (20, 10, 5.6 and 1.3 cm^2); Edge Effect (50 and 5 cm^2); Edge Compression (10 and 5 cm^2); Blister (empty and prefilled); Contact Lens; Remote cell (open and closed bottom)		50 cm^2; Reduced Area (20, 10, 5.6 and 1.3 cm^2); Edge Effect (50 and 5 cm^2); Edge Compression (10 and 5 cm^2); Blister (empty and prefilled); Contact Lens; Package adapter; Remote cell (open and closed bottom)	
Automation	Automatic testing, advance test mode, auto-test mode, sequential testing, cold temp compensation		Automatic testing, advance test mode, auto-test mode, sequential testing	

* Using Standard 50 cm^2 film cartridge
** Based on 80% usage

Film Testing Overview

High-performance analyzers like the OX-TRAN 2/22 Series feature a wide detection range and our patented COULOX sensor. Busy labs may benefit from high-throughput analyzers like the OX-TRAN 2/28 Series for high-volume, repetitive OTR testing.

Feature	OX-TRAN 2/22 H	OX-TRAN 2/22 L	OX-TRAN 2/22 10X	OX-TRAN 2/28 H	OX-TRAN 2/28 HR
Sensor Type	Absolute COULOX	Absolute COULOX	Absolute COULOX	Absolute COULOX	Absolute COULOX
OTR Range* @ 100% O_2 ($cm^3/(m^2 \cdot day)$)	0.05 to 200	0.005 to 200	0.0005 to 200	0.05 to 200 0.5 to 2000 reduced area	
OTR Range* @ 100% O_2 ($cm^3/(100in^2 \cdot day)$)	0.003 to 12.9	0.0003 to 12.9	0.00003 to 12.9	0.003 to 12.9 0.03 to 129 reduced area	
OTR Range @ 100% O_2 ($cm^3/(pkg \cdot day)$)	0.00025 to 1.0	0.000025 to 1.0	0.0000025 to 1.0	0.00025 to 1.0	
Cells (Qty x Size cm^2)	2 x 50 cm^2			4 x 50 cm^2	
Minimum sensor exam time per cell (min)	15	20	30	15	
Repeatability ($cm^3/(m^2day)$)	±0.02 or 1%	±0.002 or 1%	±0.0005 or 1%	±0.02 or 1%	
Test temperatures (°C)	10 to 40 ± 0.2			20 to 60 ± 0.2	20 to 40 ± 0.2
Carrier and/or Test Gas RH range	Dry or 5 to 90% ± 3			Dry	Dry or 50 to 90% ±5 (test gas only)
Industry standards	ASTM D3985, ASTM F1927, ASTM F1307, ASTM F2622, ISO 15105-2, JIS K 7126-2, DIN 53380-3			ASTM D3985, ASTM F2622, ISO 15105-2, JIS K 7126-2, DIN 53380-3	
Approximate sensor life** (year)	4			4	
Sensor warranty (year)	4 pro-rated			4 pro-rated	
Max barrier thickness mil (mm)	120 (3.0)			20 (0.5) @ 50 cm^2 120 (3.0) @ 5.0 or 10.0 cm^2	
Package testing capability	Yes			Yes	
Cartridge options	50 cm^2; Reduced Area (20, 10, 5.6 and 1.3 cm^2); Edge Effect (50 and 5 cm^2); Edge Compression (10 and 5 cm^2); Blister (empty and prefilled); Contact Lens; Package adapter; Remote cell (open and closed bottom)			50 cm^2, 10.0 cm^2, 5.0 cm^2, 1.0 cm^2 Edge Effect Package Adapter	
Automation	Automatic testing, advance test mode, auto-test mode, sequential testing			Automatic testing, advance test mode, auto-test mode	

* Using Standard 50 cm^2 film cartridge
** Based on 80% usage

EXPERTISE & SUPPORT

We go beyond industry-leading instruments and accessories.

Since 1966, we have set the industry standard in precision gas permeation and package testing instruments. Our dedicated team and innovative products offer the best value withan extensive range of solutions. Trusted by companies worldwide, we deliver the most accurate and repeatable results to ensure and enhance the quality and integrity of product packaging.

The world's largest permeation testing lab.

Comprehensive advanced permeation testing training.

Over 70 patents developed in our instrument solutions.

Custom application development and lab testing services for industries like healthcare, packaging and food & beverage.

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