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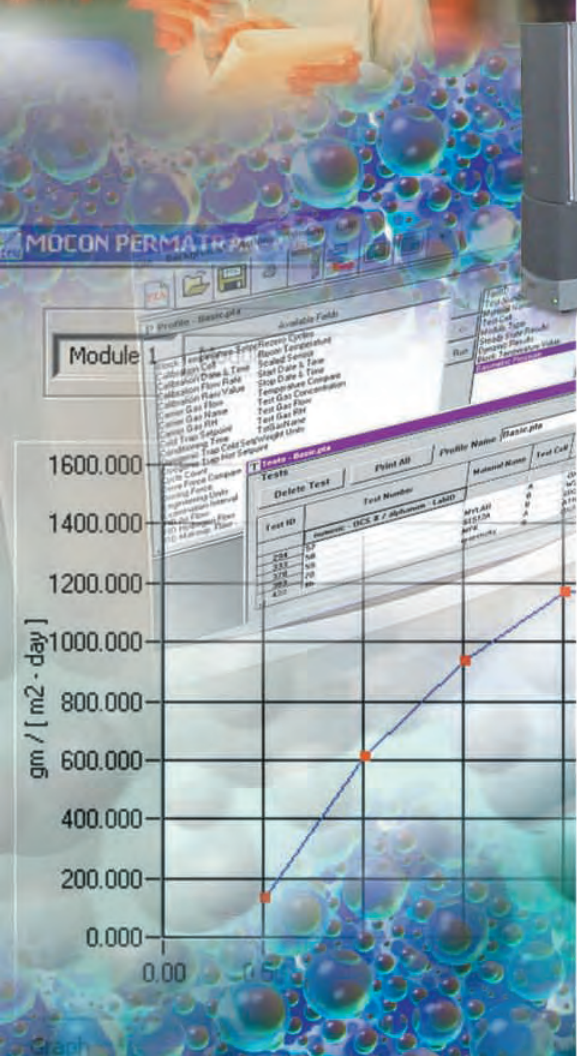
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# PERMATRAN-W<sup>®</sup> Model 3/33

The Standard for Water Vapor Transmission  
Rate Testing of Flat Films & Finished Packages



Modular Design



Validation Services  
Now Available

Only MOCON systems comply  
with the following standards:

ASTM F-1249

TAPPI T557

JIS K-7129

**mocon**<sup>®</sup>

Over 35 Years of  
Permeation Experience

Made in USA

# High Sensitivity System Performs Tests Directly At Material's "Real World" Temperature and Relative Humidity.

With MOCON's precision sensors (modulated infrared, relative humidity, temperature and flow) ... measurements are very accurate producing exceptional data. Modular system design brings flexibility while easy-to-use Windows®-based software makes material assessments free of subjective decisions with unparalleled product quality.

The PERMATRAN-W 3/33 is a Water Vapor Transmission Rate (WVTR) testing system designed to assess barrier materials used in packaging applications. If you wish to assess high barrier materials under certain conditions, (temperature, relative humidity, flow, etc.), you can change aspects of the system to better fit your need. Flexibility for you to essentially design your own system has been built right in.

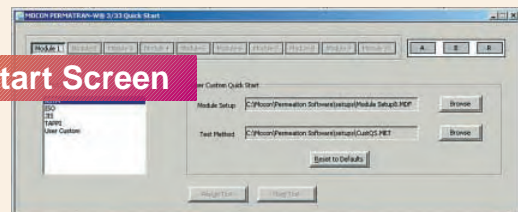
## System Certification Traceable to N.I.S.T.

PERMATRAN-W 3/33 systems are certified in accordance with N.I.S.T.. Each instrument will be issued a signed Certificate of Compliance and include a set of three pre-calibrated N.I.S.T. traceable WVTR films.



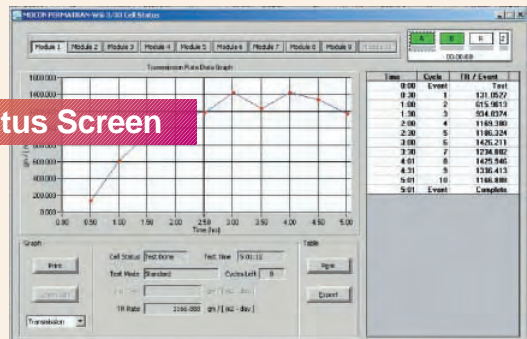
New software further speeds analysis, assures accuracy and incorporates more data handling capabilities.

Quick Start Screen

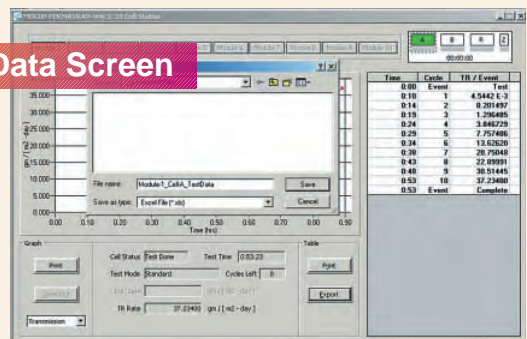


The WinPerm™ Permeability Software controls up to 20 test cells in a system and dramatically simplifies the tasks of setting up and conducting tests. Pre-programmed test and module formats as well as intuitive Windows-style set-up, control and results screens make it easy to generate and interpret test data. New features include QuickStart for fast test initiation using standard or user-defined test conditions, automatic conversion of test data to Excel format and the ability to print detailed single test results or a summary report of all tests performed on a module. The PERMATRAN-W Model 3/33 software also reduces the possibility of error with its ability to automatically determine equilibrium and compensate for flow changes.

Cell Status Screen



Export Data Screen



An additional feature in the 3/33 is the reference cell testing mode controlled through the software. The reference cell creates an increase in stability when testing higher barrier materials. Ease-of-use, design flexibility, and accurate informative WVTR data — the PERMATRAN-W 3/33 from MOCON.

# Direct Measurement System – No Extrapolations or Accumulation Needed

Consider the PERMATRAN-W 3/33's flexibility in your application. Choose from three Master Base Control Systems and three Satellite Application Modules, each providing different test capabilities. Combine a Master Base Control System (which includes a computer, printer, software and test cells) with as many as nine Satellite Application Modules for a maximum of 20 test cells per system.

All Masters include...

Computer, Printer and WinPerm™ Permeability Software

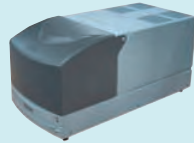
ADD ONE...

Master Base Control Systems (each contains 2 test cells)



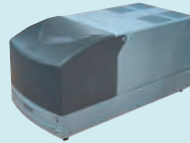
- High speed Computer & Printer
- Up to 10 modules (20 test cells) can be incorporated
- Windows® based software control
- Computer-determined equilibrium
- Double-cell film testing mode for increased sensitivity
- RS-232C output

**MG**



- Dual film test cell module
- Generation of relative humidity without salts
- Temperature Control 10 C to 40 C
- Built-in reference cell
- Computer and printer

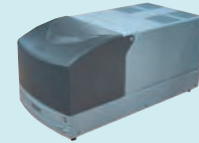
**MW**



OR

- Dual film test cell module
- Temperature Control 5 C to 50 C
- Built-in reference cell
- Computer and printer

**MA**



OR

- Dual film test cell module
- Temperature Control from 5 C above ambient to 50 C
- Built-in reference cell
- Computer and printer

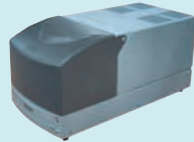
AND FROM THE CHOICES BELOW, UP TO 9 APPLICATION MODULES CAN BE ADDED— NOW OR LATER...

Package Environmental Chamber (PEC)

PEC CAN BE INSTALLED ON G&W MODULES

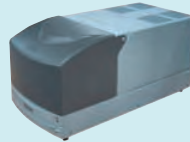
Satellite Application Modules (each contains 2 test cells, up to 9 modules per Master Base)

**SG**



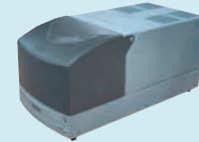
- Dual film test cell module
- Generation of relative humidity
- Temperature Control 10 C to 40 C
- Built-in reference cell

**SW**



- Dual film test cell module
- Temperature Control 5 C to 50 C
- Built-in reference cell

**SA**



- Dual film test cell module
- Temperature Control from 5 C above ambient to 50 C
- Built-in reference cell

- Package testing under select environments
- Compatible with any Master or Satellite G or W module

## Example System Configuration: 8 test cells, testing films and packages

Because the PERMATRAN-W 3/33 is a modular system, users can configure a system that fits their specific application. As testing needs change, PERMATRAN-W application modules can be added. Test capabilities increase without sacrificing the initial investment.

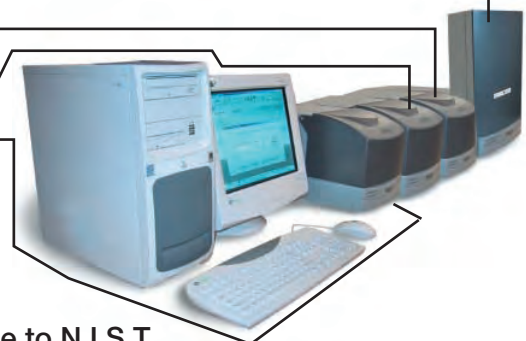
PEC installed on SW Satellite Application Module

SA Satellite Application Module

SG Satellite Application Module

MG Master Base Control Module

8 TEST CELL SYSTEM



Systems are Certified Traceable to N.I.S.T.

# High-Barrier Films and Packages are Affected by Temperature and Relative Humidity

With the 3/33, you can test the WVTR directly at the desired temperature and relative humidity

## Testing Standardization

### Typical Water Vapor Transmission Rate Test Conditions

23 C (75 F)	90% RH
37.8 C (100 F)	90% RH
22 C (73 F)	50% RH
29.4 C (85 F)	80% RH

Figure 1. It remains necessary for laboratories to choose on which test conditions they will standardize. Typical ones are shown above. Due to the extreme affects that temperature and relative humidity have on permeation, these remain the two chief sources of inconsistency of data between lab to lab and from operator to operator. The calibration method used and the operator will affect answers also. The PERMATRAN-W 3/33 makes it easy to control variables such as temperature and humidity without the need for climate controlled rooms, or salt solutions to control humidity. Repeatability from operator to operator, and lab to lab is assured. Precise answers can be achieved each time a test is performed.

## Material Variation

### Water Vapor Transmission Rate vs. Temperature

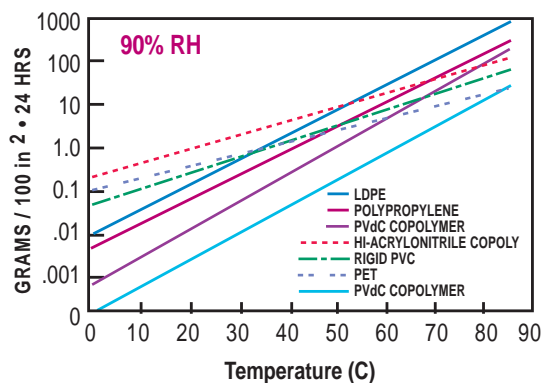


Figure 3. A variety of materials can be tested. A wide variation exists between materials even at the same temperature and relative humidity. Testing at several humidities and several temperatures is advised to gain a thorough understanding of the materials barrier characteristics.

## Barrier Film Testing PET

### Water Vapor Transmission Rate vs. Temperature

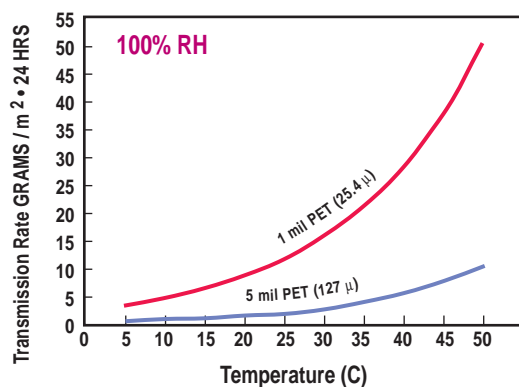


Figure 2. Temperature, thickness, and relative humidity affects the WVTR transmission rate of materials as shown above with the PET samples. A variety of combinations of materials, thicknesses, temperatures, and relative humidity can be tested on the PERMATRAN-W 3/33 System.

## Testing RH Sensitive Samples

### Actual vs. Factored WVTR

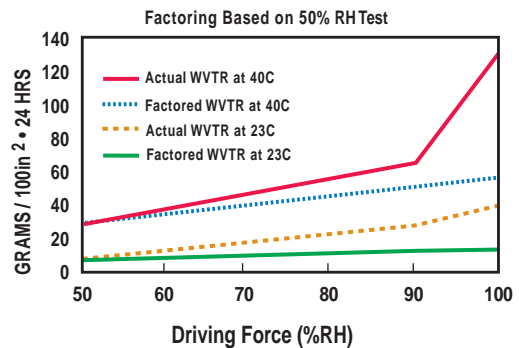
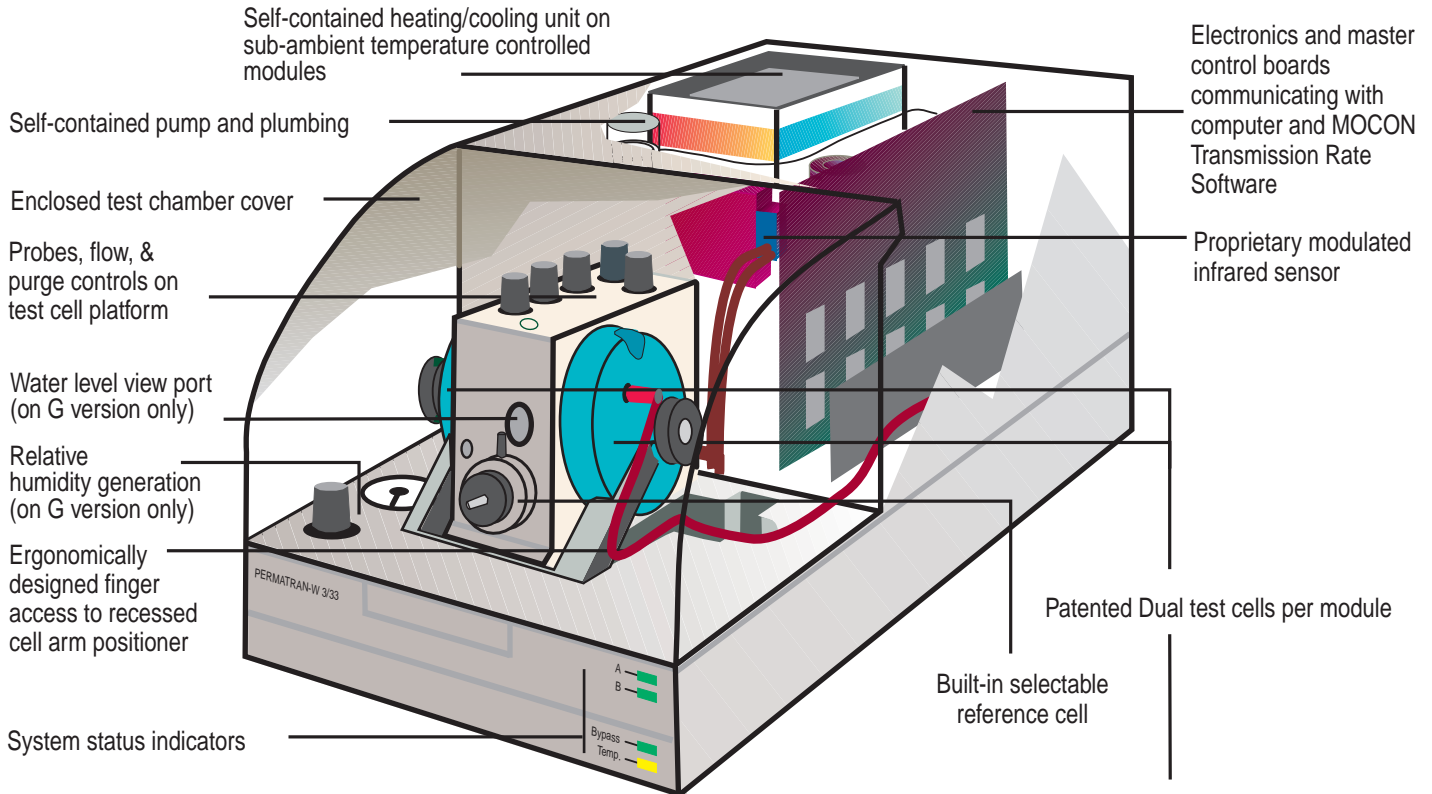


Figure 4. The PERMATRAN-W 3/33 System provides precise relative humidity with RH probes located at the site of the test sample. The data shown above demonstrates the importance of testing RH sensitive samples at precise RH. There is a marked variance in WVTR between actual and the factored RH driving force as shown in these examples.

# The ASTM and JIS Standards on PERMATRAN-W 3/33 Provide Maximum Flexibility with a Modular Design

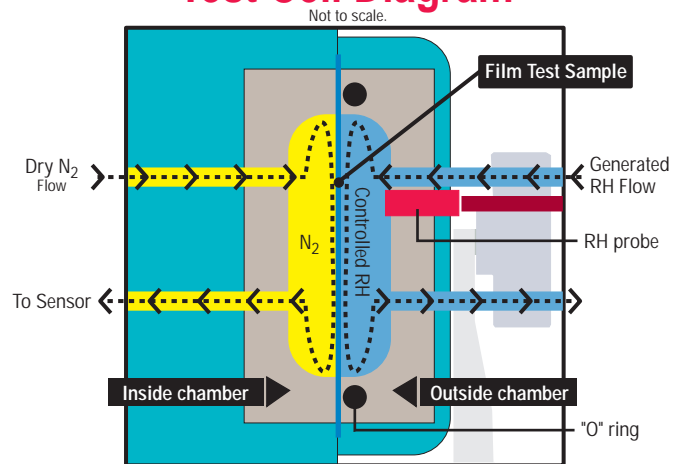


## Principle of Operation

MOCON has set the worldwide standard for permeation testing systems for over 30 years. The PERMATRAN-W 3/33 system uses a patented modulated infrared sensor to detect water vapor transmission through both flat materials and packages. This high performance sensor provides parts-per-million sensitivity.

Flat film samples are clamped into the diffusion cell, which is then purged of residual water vapor using moisture-free carrier gas. This moisture-free carrier gas is routed to the sensor until a stable WVTR has been established. On the "G" version modules, relative humidity (RH) is generated by the "two pressure method" (no need for salts to select humidity) and the resultant RH is then introduced to the outside chamber of test cells A & B. The RH of cells A & B are monitored by RH probes inserted into the outside chamber. On the "W" and "A" versions of the modules, absorbent material saturated with distilled water provides an atmosphere of 100% RH. Molecules of water diffusing through the film to the inside chamber are conveyed to the sensor by the carrier gas. The computer monitors the increase in water vapor concentration in the carrier gas and it reports that value on the screen as the water vapor transmission rate.

## Side View of "G" Version Test Cell Diagram



The G version of the system allows you to simultaneously condition and test materials over a wide range of temperature and relative humidity conditions similar to a package's actual storage environment. The film test cell in the PERMATRAN-W 3/33 module incorporates RH probes in both cells A&B to allow for control of the generated RH levels.

# P

# roduct Selection Information

## Module Choices for System Configuration

	MA	SA	MW	SW	MG	SG
<b>WVTR Test Range:</b> Note 1 Below	X	X	X	X	X	X
<b>Test Temperature Range:</b>						
5 C above ambient to 50 C	X	X				
5 C to 50 C			X	X		
10 C to 40 C					X	X
<b>Standard RH Testing (No Salts Required):</b>						
Films - 100% RH	X	X	X	X	X	X
Packages - 100% RH or Ambient	X	X	X	X	X	X
<b>Generated RH Testing (No Salts Required):</b>						
Films - 100% and 35% to 90% RH					X	X
Packages - 100% and 35% to 90% RH					X	X
<b>Test Sample Size:</b>						
Films - 4.25 in. x 4.25 in. (10.8 cm x 10.8 cm)	X	X	X	X	X	X
Packages - Up to 3 liters per package	X	X	X	X	X	X
Generated RH - Up to 2 liters per package					X	X
<b>RH PLUS Easy RH Control</b>					X	X
<b>Test Cells per Module, Two - 50cm<sup>2</sup> Test Cells</b>	X	X	X	X	X	X
<b>Expandable up to 10 modules (20 test cells)</b>	X	X	X	X	X	X
<b>Built-in Reference Cell (Standard), Selectable Zero Compensation (Standard)</b>	X	X	X	X	X	X
<b>Automatic Flow Compensation (Standard)</b>	X	X	X	X	X	X
<b>Computer, Monitor, Printer and WinPerm™ Permeability Software (Standard)</b>	X	X	X	X	X	X
<b>Automatic Temperature Monitor and Control (Standard)</b>	X	X	X	X	X	X

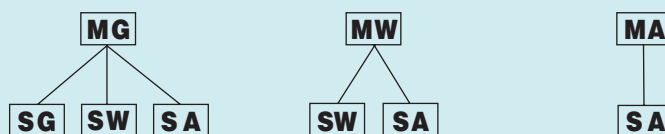
Specifications provided on request.

This instrument is ETL listed, Conforms UL Standard 1262, is Certified to CAN/CSA C22.2 No. 151, and Complies with CE Product Safety, Electromagnetic Emission & Susceptability

Note #1

Carrier Flow	Sample	g/m <sup>2</sup> /day	g/100 in <sup>2</sup> /day	g/pkg/day
100 cc/min	Unmasked	0.035 to 100	0.0023 to 6.45	0.00018 to 0.5
	Masked	0.35 to 1000	0.023 to 64.5	—
10 cc/min	Unmasked	0.005 to 10	0.0003 to 0.65	0.00003 to 0.05
	Masked	0.05 to 100	0.003 to 6.5	—

### Possible PERMATRAN-W 3/33 System Configurations starting with Master Base Control System:



### MOCON Commitment

The PERMATRAN-W 3/33 is another example of MOCON's long-standing commitment to innovation and quality in the design of permeation testing systems for barrier material and package assessment.

### Technical Support & Service

MOCON offers a variety of technical services designed to provide you with first class technical support. Whether you require technical phone support, next-day spare parts delivery, on-site training, NIST certification or "turn-key" validation, our technical support staff can tailor a service program to fit your needs. Our goal is to provide the best in product support services.

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U.S. Patent # 5,449,912, # 5,390,539, and other patents pending  
MOCON reserves the right to change specifications without notice as part of our continuous program of product improvement.

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