

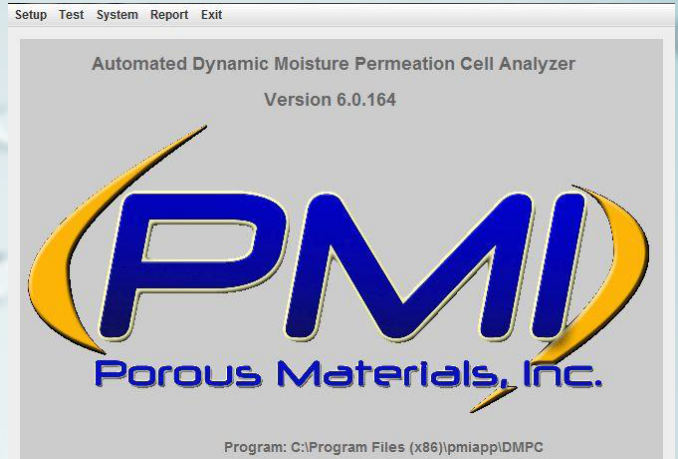


DYNAMIC MOISTURE PERMEATION ANALYZER DMPC-500A

Not just products... Solutions

APPLICATIONS

The PMI Water Vapor Transmission Analyzer is capable of measuring water vapor transmission through porous media such as textiles, leathers, man made materials, membranes, nonwovens, and fabrics used in numerous high technology components and consumer products manufactured by a variety of industries. The instrument has the unique ability to measure vapor transmission rate over a wide range of humidity, temperature, and pressure under gradients of humidity, temperature, and pressure encountered in application environments.

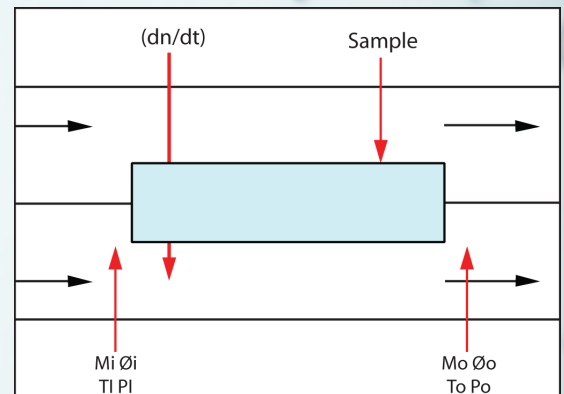


PRINCIPLE OF OPERATION

Two independent gas streams are maintained on the two sides of a sample at the desired temperature. Humidity and gas flow rates are measured. The transmission rate through the sample is computed using mass balance.

$$(dn/dt) + [(p_{e,i}\Phi_i/P_i) M_i] = [(p_{e,o}\Phi_o/P_o) M_o]$$

Where,
i = inlet *o* = outlet
t = time *M* = flow rate
n = moles Φ = humidity
P = total pressure *p* = equilibrium vapor pressure



SPECIFICATIONS

- Humidity (ϕ) measurement**
 Range: 5 - 95%
 Accuracy: $\pm 2\%$
- Humidity (ϕ) control**
 Range: 0 - 100%
 Accuracy: $\pm 1.5\%$ ($\phi = 0.5$)
 $\pm 5\%$ (high & low ϕ)
- Differential pressure transducers**
 Range: 4 torr (2 mm Hg)
 Accuracy: 0.015%
- Temperature**
 Range: RT - 100 °C
 Accuracy: 0.4 °C (low ϕ) - 0.8 °C (high ϕ) at 100 °C
 Control: $\pm 2\%$
- Mass Flow Transducers**
 Range: 5 L/min
 Accuracy: 1%
- Mass Flow Controller**
 Range: 2000 cc/min
 Accuracy: 1%

INSTRUMENT

The sample is enclosed in a sample chamber. A part of the gas flowing through each independent stream is allowed to go through bubblers while the other part bypasses the bubblers and mixes with the gas passing through the bubblers. For maintaining constant humidity in the inlet gas stream, the flow rate in each part of the gas stream is controlled. The gas pressure is controlled by the valve at the end of each gas flow line. The valves automatically control and maintain either zero differential pressure or a finite definite pressure difference. Absolute pressure remains close to the standard pressure. The inlet and outlet flow rates and humidity are measured. The water vapor transmission rate through the sample is computed using the following relation.

$$(dn/dt) = [(p_e/P)\Phi_o - (p_e/P)\Phi_i]M_o/[1 - (p_e/P)\Phi_i]$$

Open Raw Data File		Sample Information:		Test Parameters:	
Save Report to File	Sample ID: H-PS17	Top Flow Rate (SCCM):	2000.0	Bottom Flow Rate (SCCM):	2000.0
Close File	Sample Area (cm ²): 16.0	Differential Pressures (Pa):	0.25 0.0 25.0 50.0 75.0 100.0 150.0	Top Humidity (RH%):	47.0
Display Graphs	Standard: 2298-03	Sample Properties:	MESH CROWN SHRALE LAYER	Bottom Humidity (RH%):	51.3
Exit	DD Dutchmill Rd. - Ithaca - NY			Number Data Points:	100
	Phone: 607-257-5544			Data Point Interval (Sec):	5
				Water Vapor Resistance (cmH ₂ O):	0.01
				Water Vapor Resistance Rate Change (Pa):	-1.64

Differential Pressure (Pa):	Ave. Blm Temp (C):	Equ. V.P. (mmHg):	Ave. Top Inlet RH(%):	Ave. Blm Inlet RH(%):	Ave. Top Outlet RH(%):	Ave. Blm Outlet RH(%):	Ave. Outlet Flow (SCCM):
0.00	24.0	22.99	47.2	51.2	42.4	50.2	2008.1

Water Vapor Transmission Rate:	SCCM-Min:	SCCMP2-Min:	GMPO-Hour:	GMPO-Car:	KGMP2-Sec:	KGMP2-Car:
0.00	100.90	100.90	242.70	2.803E-5	2.422E0	

Report Options	Time	Data P.	P1	F1	F2	P3	F4	F5	F6	Inlet%:	InletB:	Outlet%:	OutletB:	Inset%:	InsetB:	Outlet:	OutletB:	TopBlm:	BlmBlm:
0	1	150.47	1010.63	1010.63	953.8	1136.8	2007.87	2129.47	47.04	51.26	42.52	56.37	34.27	29.93	33.56	24.06	30.0	30.1	

FEATURES

- Humidity on any side can be maintained between 5 and 95%
- Any desired pressure gradient can be maintained
- Any desired test temperature can be achieved
- Simultaneous pressure and humidity gradients can be maintained
- Flat samples in a wide range of sizes can be accommodated
- Completely automated
 - Test execution
 - Data acquisition
 - Data storage
 - Data reduction

Sensor	Counts	Value
Differential Pressure	2000	0.00 Pa
Flow 1 (Wet)	2000	0.0 SCCM
Flow 2 (Dry)	2000	0.0 SCCM
Flow 3 (Wet)	2000	0.0 SCCM
Flow 4 (Dry)	2000	0.0 SCCM
Flow 5	2000	0.0 SCCM
Flow 6	2000	0.0 SCCM
Inlet Top Humidity	2000	0.00 %rh
Inlet Blm Humidity	2000	0.00 %rh
Outlet Top Humidity	2000	0.00 %rh
Outlet Blm Humidity	2000	0.00 %rh
Inlet Top Air Temperature	2000	-40.000 C
Inlet Blm Air Temperature	2000	-40.000 C
Outlet Top Air Temperature	2000	-40.000 C
Outlet Blm Air Temperature	2000	-40.000 C
Top Controller Set Point		0.0 C
Top cabinet		0.0
Blm Controller Set Point		30.0 C
Bottom cabinet		0.1
Master Ground	2000	0.0000 volts
Master Reference	2000	0.0000 volts
Slave Ground	2000	0.0000 volts
Slave Reference	2000	0.0000 volts
Top sample chamber		0.2
Bottom sample chamber		0.3
Chiller 1		0.4
Chiller 2		0.5

SALES & SERVICE

Our sales team is dedicated to helping our customers find which machine is right for their situation. We also offer custom machines for customers with unique needs. To find out what we can do for you, contact us. We are committed to customer support including specific service products, short response times & customer specific solutions. To quickly & flexibly meet our customer's requirement, we offer a comprehensive range of services.

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