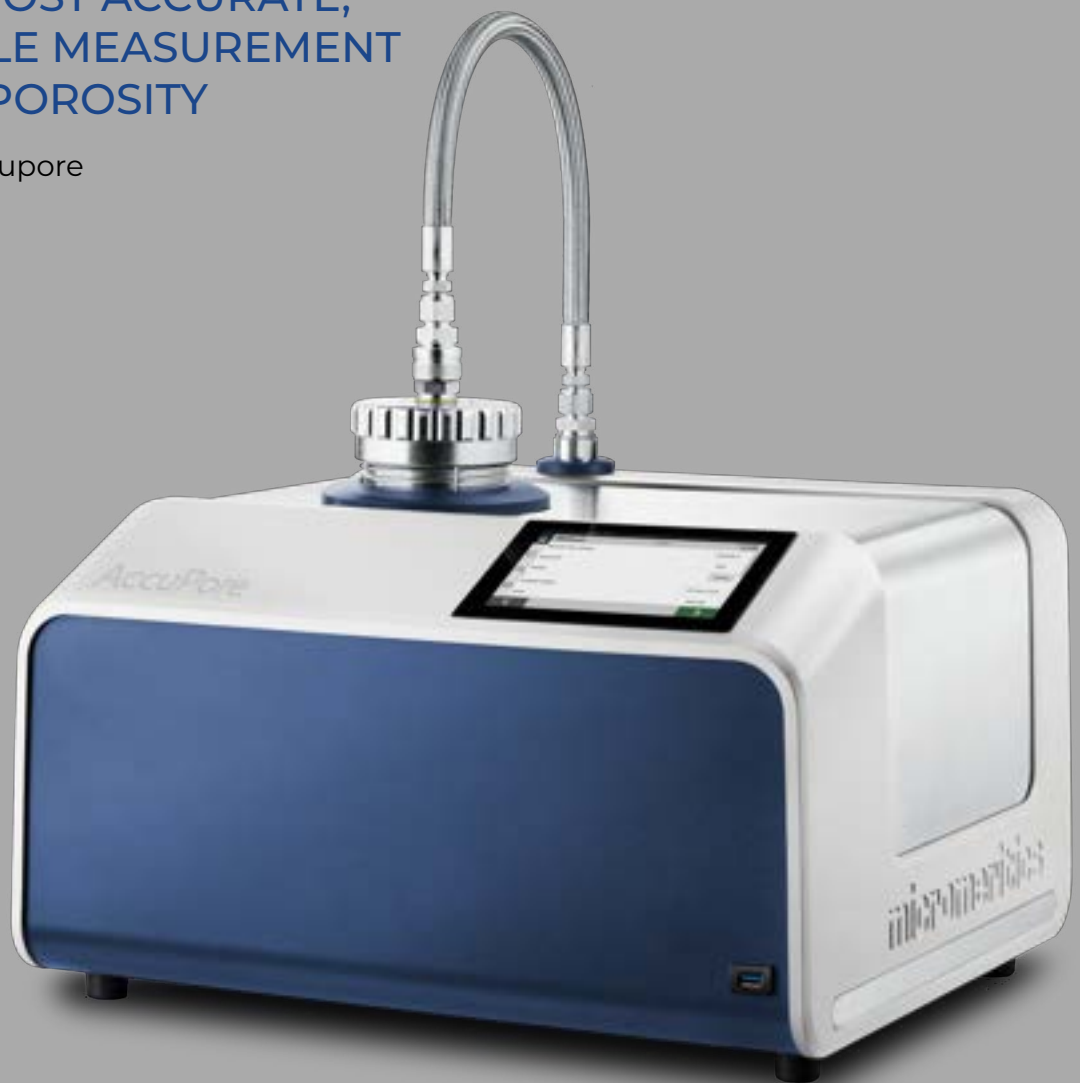


# ACCUPORE

THE EASIEST, MOST ACCURATE,  
MOST VERSATILE MEASUREMENT  
OF THROUGH-POROSITY

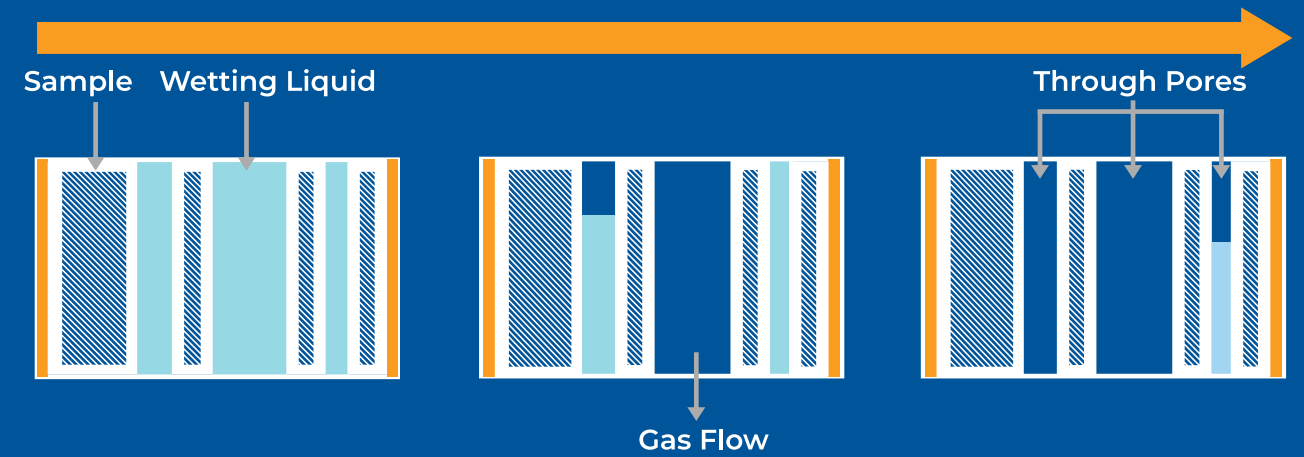
[micromeritics.com/accupore](http://micromeritics.com/accupore)



# CAPILLARY FLOW POROMETRY THROUGH-PORE SIZE DISTRIBUTION

Capillary Flow Porometry (CFP) — also known as Gas Liquid Porometry (GLP) — is a fast, reliable method to determine the size and relative abundance of through-pores in sheets and membranes. This pressure-based technique measures the minimum diameter of a pore, averaging over a significant test area, without the need for model-fitting or image processing. Measurements are fast, sample preparation takes less than 30 seconds, and no mercury is involved.

Increasing Pressure



## SAMPLE PREPARATION

Sample is wetted with a special fluid that fills every pore.



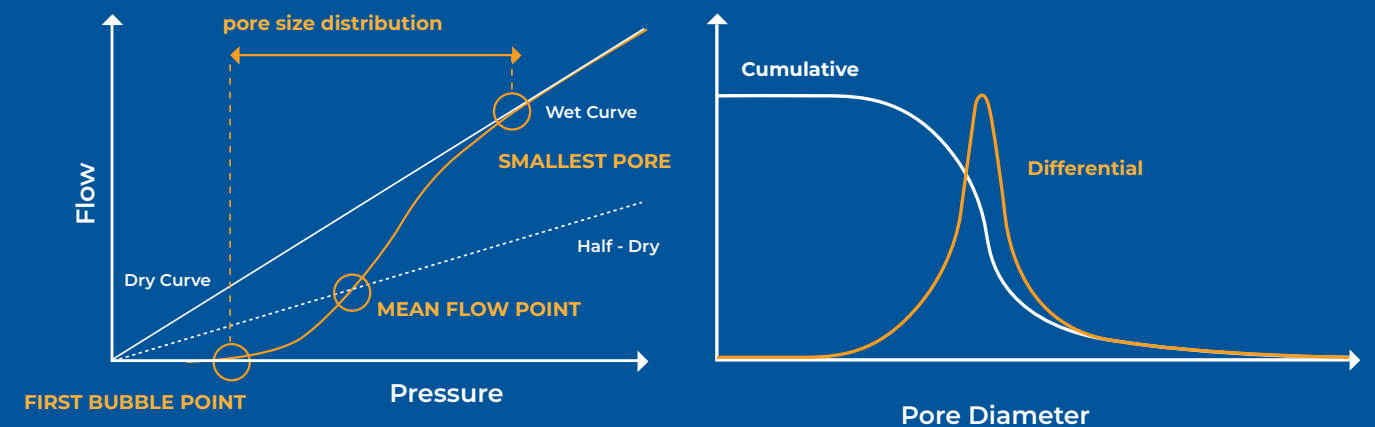
## WET CURVE

Gas pressure is applied to force the wetting fluid from the pores. Larger pores open at lower pressure. Increasing pressure opens more, smaller pores, increasing gas flow rate through the sample.



## DRY CURVE

After all pores are opened and all of the wetting fluid has been expelled from the sample, flow across the un-wetted dry film is measured.



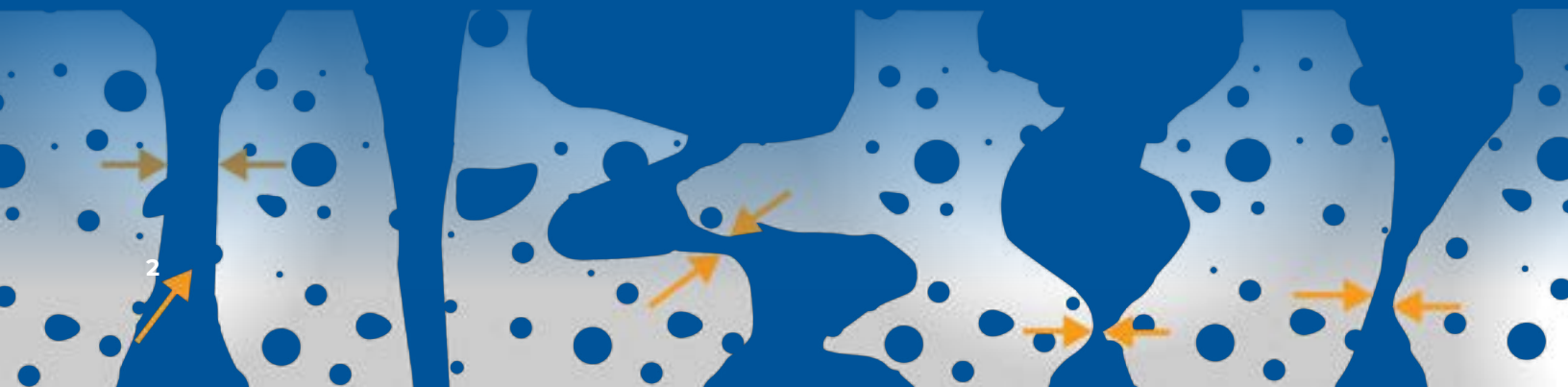
## KEY MEASUREMENTS

**BUBBLE POINT, LARGEST PORE:**  
The lowest pressure at which flow occurs.

**SMALLEST PORE:**  
Intersection of the wet curve with the dry curve.

**MEAN FLOW PORE:**  
Intersection of the wet curve with the dry curve divided by two — the half-dry curve.

**PORE SIZE DISTRIBUTION:**  
A continuous distribution of the differential and cumulative pore size reveals the overall structure of pores in a membrane.



# ACCUPORE FEATURES

LEARN MORE →

**Flexible easy-to-use sample chamber**  
for simple sample loading including samples  
from 13 mm to 47 mm diameter.

**High-speed control, collection, and data processing**  
provides the most accurate pressure control, highest curve  
resolution, and most detailed pore size distribution by  
processing measurements at up to 20 Hz.



**Intuitive Breeze Interface**  
makes it easy to measure samples and  
review results with or without a PC.

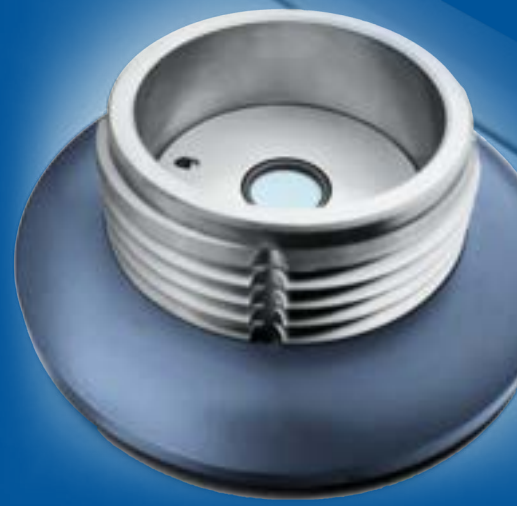
**MIC Net**  
empowers your lab to operate as one  
by synchronizing results and methods  
across AccuPore instruments. Laboratory  
network connection provides simple data  
retrieval and LIMS integration.

**Auto-switching gas supply**  
reduces cost of operation by using low pressure  
compressed air when suitable, allowing high  
pressure bottled gas tanks to last longer.

**Convenient USB**  
access for data transfer or peripheral  
device integration. Even more ports at the  
back of the instrument.

## BETTER MEASUREMENTS WITH SMARTFLOW

The AccuPore features SmartFlow, an advanced flow control system that guarantees the **most precise pressure control, highest sensitivity, and lowest signal noise**. High-resolution 24-bit electronics operated at 20 Hz for optimal signal quality and system response. With eight complementary transducers and controllers, SmartFlow delivers the most responsive and stable performance, even during rapidly changing conditions such as pore opening.



## THE MOST ACCURATE BUBBLE POINT

SmartFlow also enables direct measurement of **true bubble point** through a proprietary flow-controlled method that provides **unmatched accuracy and repeatability**. Conventional estimates of bubble point from pressure ramps lack sensitivity and can underestimate the largest pore diameter. SmartFlow ensures precise bubble point measurements, typically much better than  $\pm 1\%$ .

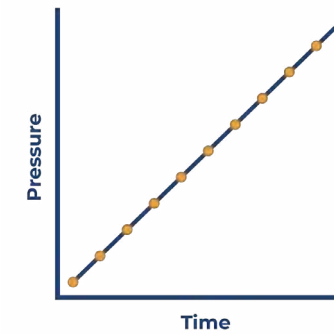
First Bubble Point Size ( $\mu\text{m}$ )				
Measurement	Track-etched membrane A	Track-etched membrane B	Track-etched membrane C	Track-etched membrane D
1	1.153	0.309	0.092	0.055
2	1.151	0.309	0.092	0.055
3	1.170	0.308	0.092	0.054
4	1.164	0.309	0.091	0.054
5	1.162	0.308	0.092	0.054
6	1.180	0.308	0.091	0.054
7	1.166	0.309	0.091	0.054
8	1.178	0.310	0.091	0.054
9	1.175	0.308	0.090	0.054
10	1.165	0.309	0.090	0.054
Average	1.166	0.309	0.091	0.054
Relative standard deviation	0.83%	0.22%	0.72%	0.54%

## EXCLUSIVE PRESSURE RAMP AND STEP CAPABILITY

The SmartFlow system provides **precision control for porosimetry in either pressure ramp or step modes**. The option to perform measurements in either mode ensures the correct measurement is available from routine qualification to detailed characterization.

### PRESSURE RAMP

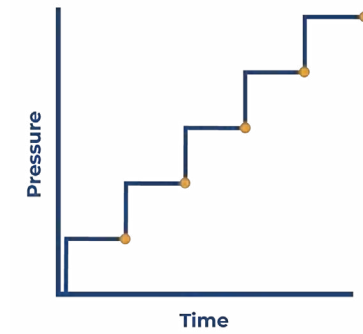
Increasing pressure at a steady rate shortens measurement time, provides a highly repeatable measurement, and produces data points tightly spaced in pressure.



Routine operation, producing high resolution, highly repeatable data, in a short time.

### PRESSURE STEP

Pausing at each pressure for equilibration allows all pores of a given diameter to fully empty before moving to the next pressure, regardless of pore length or tortuosity.



Highest possible resolution and absolute pore size accuracy especially for complex pores and thick sheets.

**FAST**

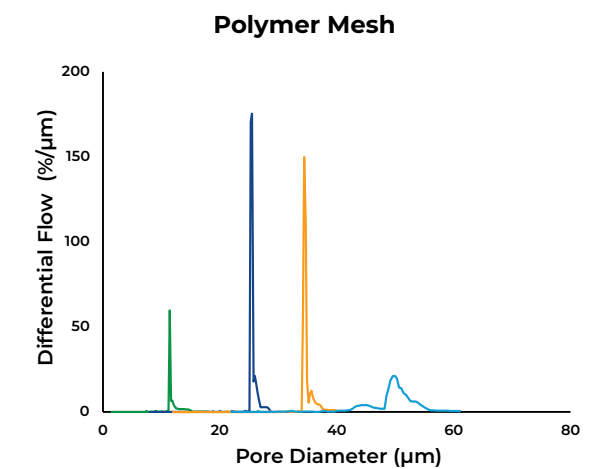
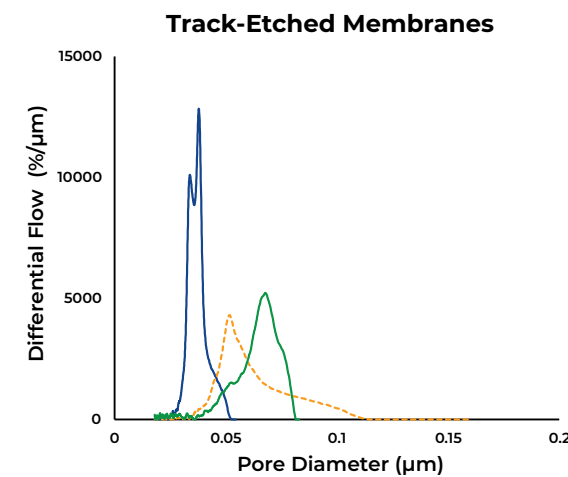
**REPEATABLE**

**DETAILED**

**ABSOLUTE**

## DETAILED PORE DISTRIBUTION WITHOUT CURVE FITTING

High resolution, low noise pressure-flow curves enable highly detailed pore size distributions that reflect physical pore architecture **WITHOUT** curve fitting or post-processing.



## ULTIMATE SAMPLE SIZE FLEXIBILITY

The flexible design of the AccuPore CFP makes it simple to move between sample diameters: 13 mm, 25, mm, 47 mm **all within the same sample chamber**. A selection of sample supports provide reliable measurements to the highest pressures, even for thin or weak membranes while also reducing gas consumption by up to 95%.



## WETTING FLUIDS

Micromeritics wetting fluids meet the analytical challenges of new material characterization and support the requirements of legacy methods. GalWick is often preferred for its low surface energy and vapor pressure: filling pores completely and resisting evaporation during analysis. Porewick is also available for legacy method compatibility and specific demanding applications.

## PEACE OF MIND WITH CERTIFIED SAFETY AND COMPLIANCE

Install and operate the AccuPore with confidence, knowing it has been designed and tested to the **highest standards for EMC compliance and operator safety**.

*Vented pressure cap seal  
Real time pressure indicator  
CB-scheme  
UL/CSA 61010-1, -2-081*



## RUN, REVIEW, REPORT – AT YOUR FINGERTIPS

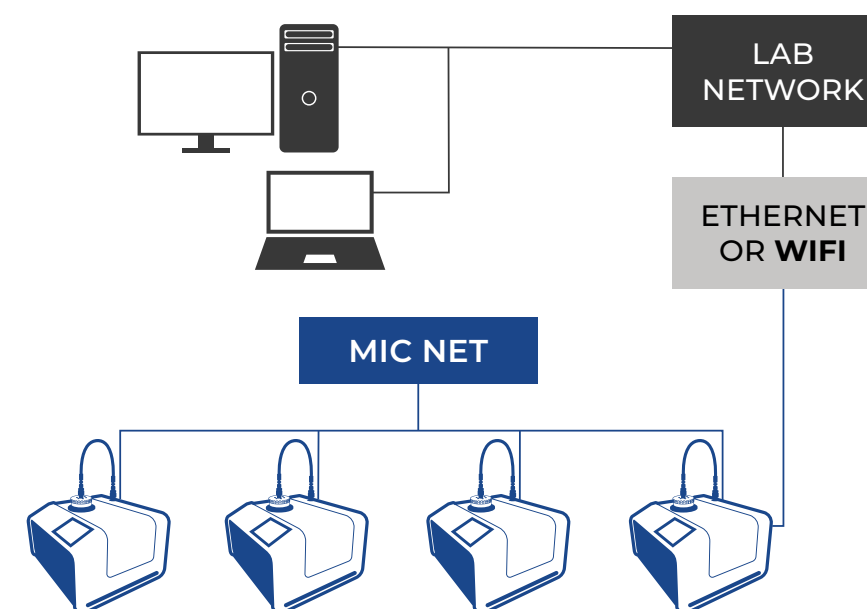
The intuitive **Breeze** touch interface gives you everything you need at your fingertips. Perform a measurement, review past results, send a report to print or to LIMS (PDF, text, or Excel) with the touch of a finger. Save space in your lab by eliminating a PC from the bench.

Prefer to work from a PC nearby or in your office? You can do that too! Execute measurements, view status of multiple instruments, or review results...anywhere.

<b>Automatic results generation and retrieval:</b>
Largest pore diameter (bubble point) Mean pore diameter Smallest pore diameter Pore size distribution
<b>Tabular review of detailed test data</b>
<b>Porometry and Pore Size Distribution curve display</b>
<b>Generate reports including print and export to file</b>
<b>Export to file via network or USB</b>

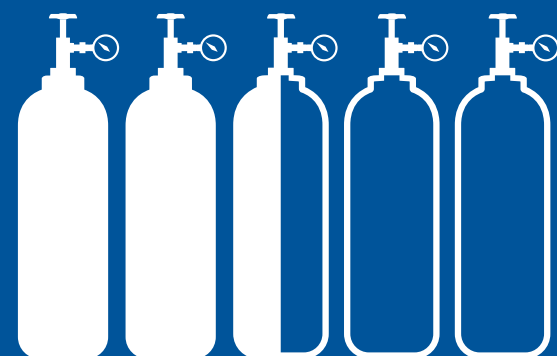
## ACT AS ONE WITH MIC NET

Never hunt for a past result or worry that your method settings are out of date. MIC Net is an instrument-to-instrument network that shares and stores results and methods across devices.



## MEASURE RIGHT, WITHOUT QUESTIONS

Different materials require specific operating conditions. Whether measuring bubble point, routine pore size distribution, or detailed structure analysis, the AccuPore simplifies it all. With SmartFlow pressure control, it doesn't take an expert to operate. Fewer settings and adjustable parameters make method development fast and worry-free. Use the **Method Library** to define, store, and recall your methods easily, so you always measure the same way — the right way.

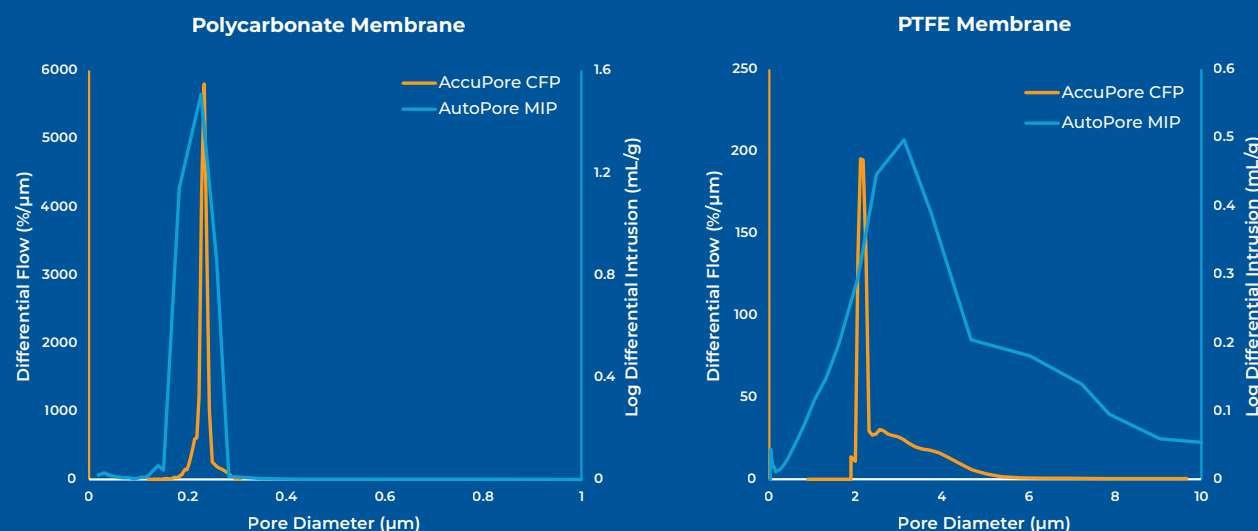


## CUT COSTS WITH SMART GAS SELECTION

Reduce operational costs with intelligent gas source selection. The AccuPore uses a compressor for low-pressure operations (bubble point measurement and large pores) and switches to high-pressure bottled gas for analysis of small pores. This reduces the need for expensive high-pressure gas, **lowering your recurring costs.**

## MOVE QUICKLY FROM DATA TO DECISION WITH MICROACTIVE ANALYSIS AND REPORTING

MicroActive software streamlines data processing, offering detailed plotting, analysis and reporting, including statistical process control charts and results overlays. Gas-liquid CFP is a direct complement to mercury intrusion porosimetry (MIP), providing a rich description of pore architecture. Only with **MicroActive can you easily co-plot results from the AccuPore CFP and AutoPore MIP** to fully describe the pore characteristics of a material.



## SPECIFICATIONS CAPABILITIES

### Performance Specifications

Technique	Capillary Flow Porometry ASTM F316
Measurement Method	Pressure Ramp Pressure Step
Pore Size Range	0.013 µm to 500 µm*
Max Pressure	500 psi / 35 bar
Max Flow Rate	200 L/min
Analysis Gas Supply	Air or N <sub>2</sub>
Operational Modes	Bubble Point (Direct Measure) Capillary Flow Porometry by: <i>Dry/Wet, Wet/Dry, Wet/Calculated Dry</i>
Physical Dimensions	57 cm Wide x 61 cm Deep
Curve Resolution	>1000 data points per run 20 Hz internal data processing speed
Sample Sizes	25 mm diameter standard Adapters available for 13 mm, 47 mm diameter

\*Depending on wetting fluid

### Features

Automatic gas source selection reduces cost of operation
Built-in Breeze touchscreen UI with full standalone instrument control and data analysis
Remote PC control and data analysis over network connection
MicroActive software: Advanced analysis and reporting, coplot with complementary porosity data
Data transfer via USB and wired (ethernet) or wireless (Wi-Fi) network communication
Network printing including wireless via Airprint for simple report creation

# RELEVANT APPLICATIONS



## BATTERY AND FUEL CELL SEPARATORS AND MEMBRANES

Optimize the rate of ion transport and physical separation to ensure device safety. Precision sample supports and advanced pressure control enable accurate measurements up to high pressure for small pores and thin membranes.



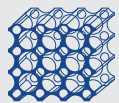
## FILTRATION

Predict and ensure size-based selectivity and mass-transfer rate by optimizing the number and size of pores.



## NON-WOVENS

Often characterized by a broad distribution of pore sizes due to their production methods. These are common choices for filtration media. In-plane porosity and irregular pore shapes make steady flow determination of bubble point especially important.



## METAL AND CERAMICS

Preferred for thermal, physical, and chemical resistance, these materials often have highly porous structures. The three-dimensional porosity of these materials makes it especially important to measurement porosity in the direction of intended flow.

# APPLICATION SUPPORT

[micromeritics.com/apps](https://micromeritics.com/apps)

Micromeritics' team provides industry-leading, high-quality application support and training to assist scientists, engineers, and analysts in the field of material characterization. Our application support team is composed of scientists and engineers to help users obtain the highest quality data and information about their material from Micromeritics Instruments. The Micromeritics team is dedicated to helping users successfully use their Micromeritics Instruments for the life of their instrument.



Expert, lifetime, applications support for Micromeritics customers.



Free training courses, application notes and how-to videos available on [www.micromeritics.com](https://www.micromeritics.com)



Applications specific, hands-on training available in Micromeritics USA, Germany, Korea, and China facilities



Collaborations with industrial and academic partners to continually improve the quality of measurements and interpretation of material characterization data



## SERVICE SUPPORT

[micromeritics.com/service](https://micromeritics.com/service)

Customer service is at the heart of what we do with over 10,000 installations during the past 60 years.

### ISO-9001 CERTIFIED SERVICES



1 Year Parts and Labor Warranty



Preventative Maintenance



Maximized uptime



Reduced cost of ownership

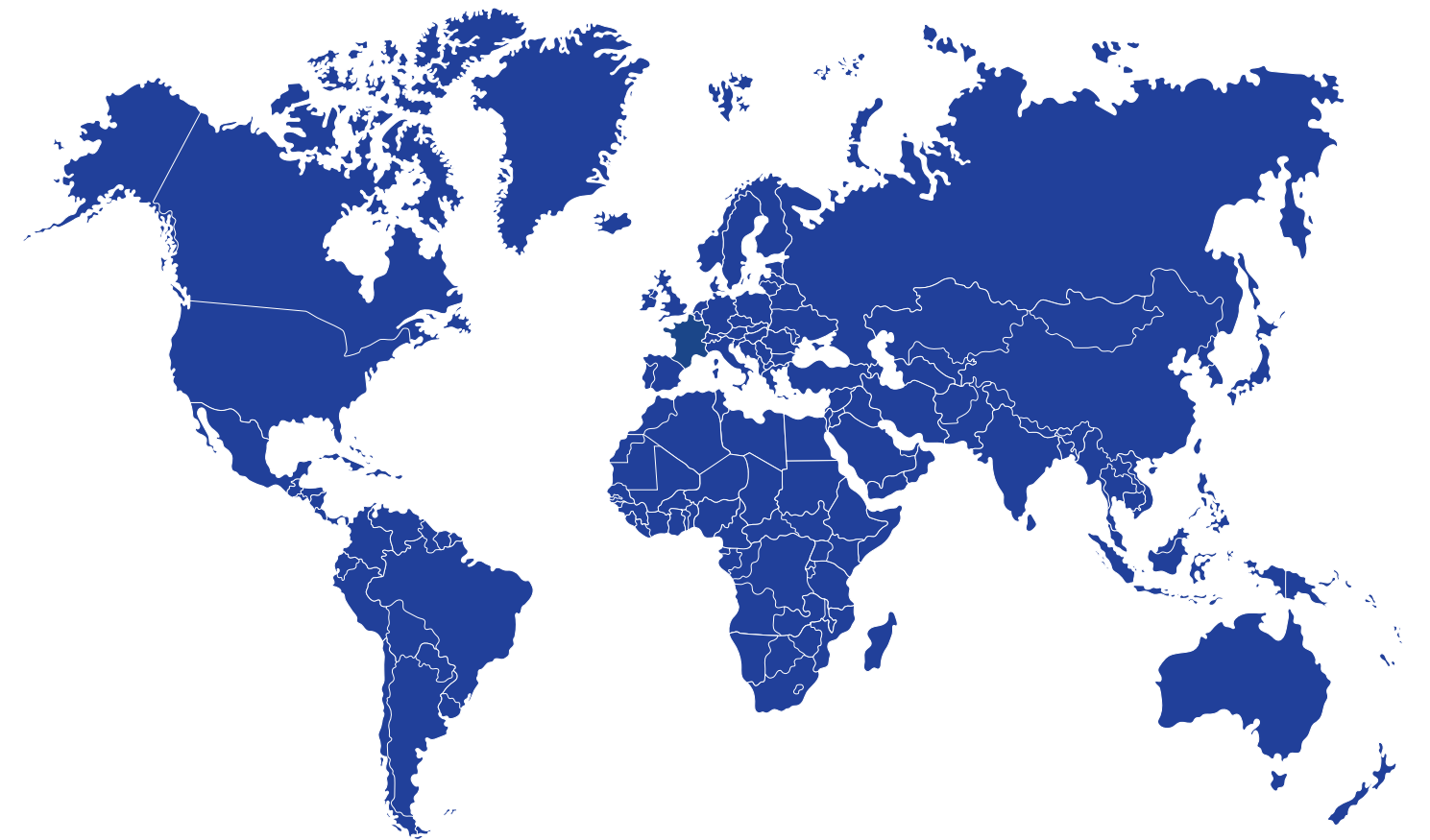


Well-trained users



Predictable, easy-to-budget-for expenses with protection from unexpected operating costs

Micromeritics offers a full range of instrument installation, preventive maintenance and repair services to support instruments through their full life cycle. On-site and factory services are provided through our global network of factory trained and certified service engineers.



## WORLDWIDE PRESENCE

[micromeritics.com/worldwide](https://micromeritics.com/worldwide) →

**MORE than 12,000 Micromeritics systems** are used every day in the labs of the most innovative companies and the most prestigious government and academic institutions.

**MORE customers choose Micromeritics for their powdered and porous material characterization systems**, than all of our competitors combined.

Get **MORE** from Micromeritics

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