



# AUTOPORE V

Mercury Intrusion Porosimetry



# A NEW BENCHMARK FOR OPERATIONAL SAFETY

## Triple Fail Safe - 1 Penetrometer Safety Cap

In case of operator error, this device prevents the penetrometer or rod being released from port unintentionally

## Triple Fail Safe - 3 System Pressure Vent on Manifold

Works in concert with Cap Interlock to automatically vent system pressure if above ambient pressure and error condition is detected

## Mercury Vapor Detection Device

Handheld device to check localized mercury vapor levels that exceed defined safety limits. Portable device allows point checks at the instrument or any location within the lab exposed to mercury

## Mercury Vapor Capture Filter

Affixed to vacuum pump, this filter prevents release of mercury vapors. This is a superior and safer solution to cold trap dewars used in competitive instruments, particularly if the constantly evaporating cryogen level is insufficiently maintained

## Triple Fail Safe - 2 Interlock on Locking Cap

Verifies that capacitance detector is installed on low-pressure port, automatically suspends run, and permits user to check filling of the penetrometer prior to run

## Mercury Collection Trays

Safe collection of mercury for disposal in the case of compromised penetrometer seals or operator error resulting in broken penetrometers

## Improved Mercury Funnel Design

Attached screw cap and funnel-shaped opening eliminates mercury contamination and possible drip-spillage associated with separate detached filling funnel. Attached screw cap prevents loose cap and possible vapor release

## Software Control for Fine Powder Samples

Prevents fine powder from accidental aspiration into low-pressure ports during analysis by using intelligent evacuation controlled by sample type

## Mercury Temperature Sensor

The ability to set a temperature limit in the software allows the display of a warning message if the temperature is exceeded



# OPERATIONAL ADVANTAGES

- Ability to measure pore diameters from 0.003 to 1100\*  $\mu\text{m}$   
\*Calculated with an initial filling pressure of 0.2psia (0.00128MPa)
- Controlled pressure can increase in increments as fine as 0.05 psia from 0.2 to 50 psia. This allows detailed data to be collected in the macropore region
- High-resolution (sub-microliter) measurement of intrusion/extrusion volumes produces extraordinary precision allowing the development of tighter sample specifications, improved production processes, and high-quality research data
- Operates in scanning and time- or rate-of-intrusion equilibrated modes
- Real-time diagnostics provide knowledge of an issue before it becomes critical or impairs your analytical results
- Collects extremely high-resolution data; better than 0.1  $\mu\text{L}$  for mercury intrusion and extrusion volume
- Improved linear motion for high-pressure chamber closure

# DESIGN ADVANTAGES

- Improved safety features reduce the risk of mercury spills and operator exposure
- Available with four low- and two high-pressure ports for increased sample throughput
- Available in 33,000 psia or 60,000 psia models
- Low-noise, high-pressure generating system
- A quick-scan mode allows a continuous pressure increase approximating equilibrium and providing faster screening
- A choice of correction routine for baseline (automatic, differential, or manual) produces greater accuracy by correcting for compressibility and thermal effects caused by high pressure
- Choice of pressure ramping methods lets you choose the scanning mode for high-speed or on-demand results, or equilibration mode for more accurate results with greater detail
- Mercury temperature sensor allows automatic calculation of mercury density used for penetrometer calibrations
- MicroActive software allows you to interactively manipulate data, define custom reports, and quickly achieve analytical results
- Compensation for material compression under high-pressure analysis



# TWO MODELS

The AutoPore V is available in two models to best match the needs of individual quality assurance and research labs.

	9605	9620
Low Pressure	4 ports	4 ports
High Pressure	2 ports @ 33,000 psia	2 ports @ 60,000 psia

# MICROACTIVE FOR AUTOPORE



## Intelligent, Intuitive, Interactive

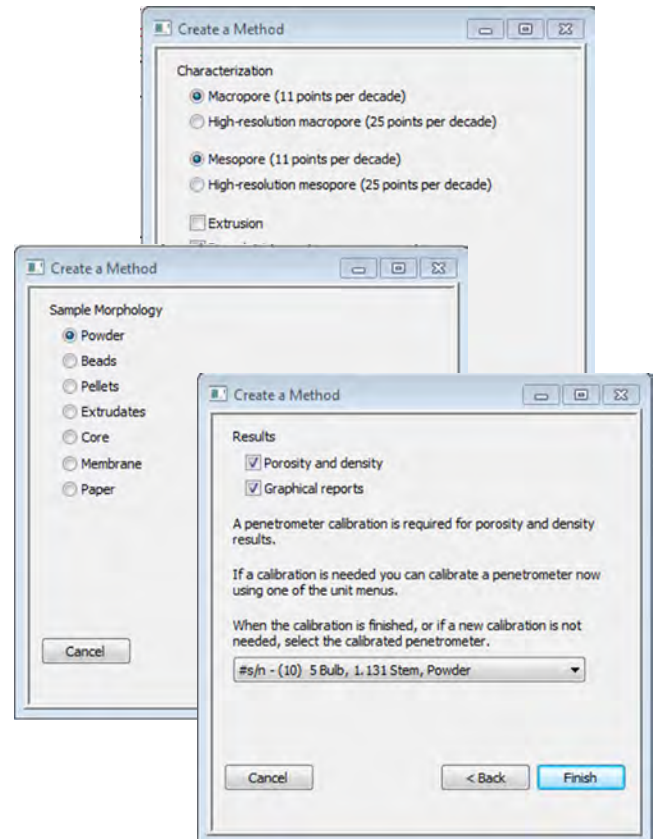
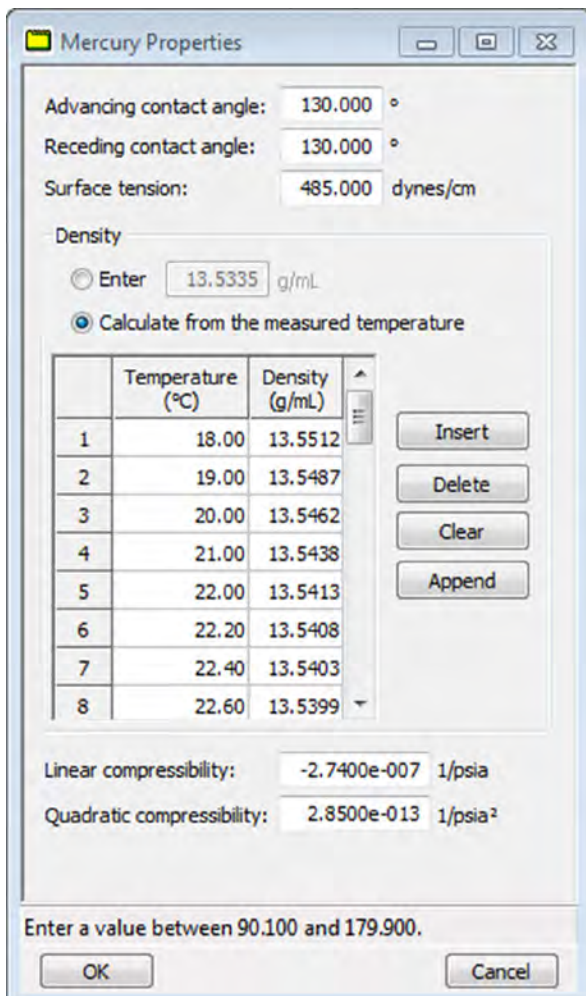
MicroActive software greatly improves the functionality, convenience, diagnostics, and data interpretation that establish the new standard for high-performance results in mercury porosimetry.

## Method Wizard

Build a method through an interactive step-by-step script. Eases method creation and new user introduction to the operation of the AutoPore V.

## Mercury Density Calculation

Unlike competitive systems that use mercury density at ambient temperature only, the AutoPore V automatically measures the actual mercury temperature for accurate density calculations under operation conditions.



## User-Defined Reports and Report Options

You can quickly create custom advanced reports to meet your specific needs using Python scripting. New report options permit automatic report conversion to PDF or spreadsheet formats.

## Post-Analysis Parameter Change

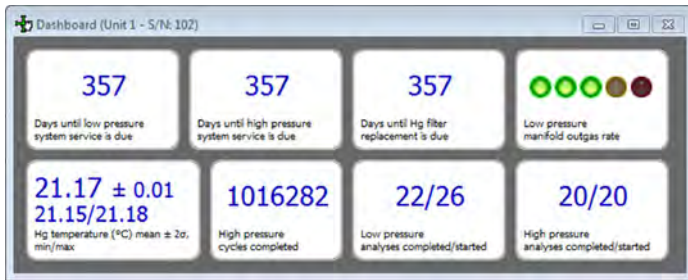
Allows analysis parameters (stem volume, maximum head pressure, pen constant) to be changed or corrected post analysis, eliminating re-running samples due to error.

## Reverberi Method Data Reduction

Receive information on the distribution of pore shape. The method yields a three-dimensional array of cavity size and throat size vs. volume.

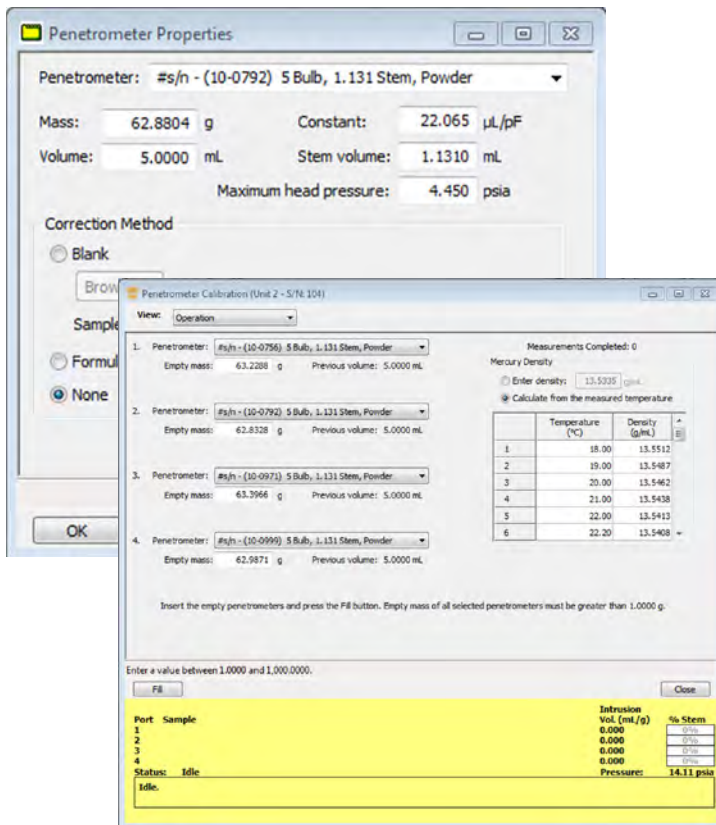
# Diagnostic Dashboard

Real-time monitoring of critical system components for preventative maintenance and trouble shooting



# Enhanced Penetrometer Calibration

Simplifies penetrometer calibration through automated calculations either volumetrically or gravimetrically



# Overlay Multiple Runs and Gas Adsorption Data

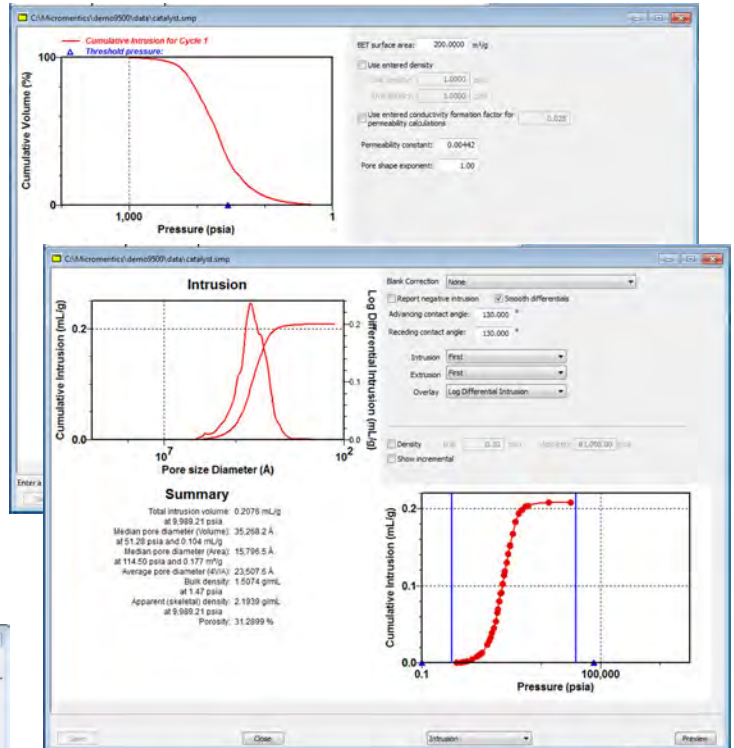
MicroActive for Autopore V provides the ability to overlay up to 20 runs. Included is the option to import pore size distributions from gas adsorption isotherms to provide analysis data in the micro to macropore range in a single report

# Intelligent Data Reporting

Warnings are supplied automatically when suspect data are collected

# Variety of Available Plots

Pore volume, pore area, and pore size plots are available as well as the ability to calculate total intrusion volume, total pore (surface) area, median pore diameters, average pore diameters, bulk or envelope density, and apparent (skeletal) density



# Reports Include

- Summary
- Tabular Report
- Cumulative Volume vs Size
- Incremental Volume vs Size
- Cumulative Area vs Size
- Cumulative Volume vs Pressure
- Incremental Volume vs Pressure
- Differential Volume vs Size 1
- Log Difference Volume vs Size
- Differential Reference % Volume vs Size
- Out Spec. % Volume vs Pressure
- Differential Volume vs Size 2
- Material Compressibility
- Cavity to Throat Size Ratio
- Fractal Dimension
- Mayer-Stowe Particle Size
- Tortuosity
- Permeability
- Reverberi
- Advanced Report System

# PENETROMETERS

## Partial List

Model#	Size	Stem Volume	Medium	Typical Use
01	15 cc	0.392	Solid	refractories, low-porosity solid rocks/cores, low porosity solid polymers
02	15 cc	0.392	Powder	low-porosity powders, gravel, irregular rock shapes
03	15 cc	1.131	Solid	medium-porosity rocks/cores, solid materials
04	15 cc	1.131	Powder	medium-porosity rocks, solid materials, fumed silica
07	5 cc	0.392	Solid	paper, flexible polymer/membrane sheets, pharma tablets
08	5 cc	0.392	Powder	silicates, catalysts, powders (general use), pharma powders
09	5 cc	1.131	Solid	medium/high-porosity sheet-form materials (paper, polymer, etc.), pharma tablets
10	5 cc	1.131	Powder	silica-alumina, silicates, zeolites, catalysts, powders (general use), pharma powders
14	3 cc	0.412	Powder	powders (general use), materials with low quantity available
24	15 cc	3.263	Solid	high-porosity rock/cores, low-density/high-porosity foams
25	15 cc	4.185	Solid	high-porosity material with large volume

# ACCESSORIES

## Penetrometer Rack

Safely store and transport penetrometers to prevent breakage and unnecessary replacement.



## Mercury QuikVac

Mercury QuikVac is an excellent low-cost method for quickly containing mercury spills. The device is designed to be specifically useful in collecting those elusive mercury droplets and small mercury-contaminated particulate matter. Mercury is collected in a 250-mL recovery vessel and a replaceable 0.3 - 0.5 micron activated carbon filter assures that the device exhausts clean, safe air.





Height:

143 cm (56.25 in.)

Width:

54.3 cm (21.38 in.)

Depth:

78 cm (30.75 in.)

Weight:

250 kg (500 lb)

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

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