

**Pycnomatic ATC**  
For solids and powders density



The first multi-volume gas pycnometer with  
integrated automatic temperature control



### Fastest results in density tests

In gas pycnometry the speed of analysis is mainly limited by the time taken to reach the thermal stability and by the required level of reproducibility in the determination of sample volume. The innovative and powerful temperature control of the Pycnomatic is based on a built-in Peltier device that dramatically reduces the time necessary to achieve the thermal stability of the sample. This enables the user to obtain a very high level of precision in a matter of minutes.

The ability of the system to reach the thermal equilibrium quickly is of particular benefit when a high sample throughput is required. The Pycnomatic avoids both long dead times and a high number of purging cycles before the test.

### The highest temperature stability means the highest accuracy of results

Pycnomatic offers extremely precise temperature control through the use of a powerful built-in Peltier element. This device controls the reference and sample chambers' temperature with a precision of  $\pm 0.01$  °C (in typical operation conditions). It also permits the user to set the analysis temperature in the range from 18 °C to 35 °C, in steps of 0.01 °C. This precise temperature control avoids any affect of volume changes that can occur due to room temperature fluctuations during the test thus ensuring accurate and reproducible results.

The only pycnometer with fully integrated temperature control



# Experience Pycnomatic Precision

Pycnomatic is uniquely designed for a safe test of fine powder samples. Venting to atmosphere can be performed through a dedicated outlet port that ensures the pressure drops slowly down to atmospheric value thus eliminating any risk of either sample loss or system contamination. Finally, the pressure applied to the sample is kept to the minimum required to obtain an accurate result, thus reducing the risk of sample compression (i.e. in case of foams).

Accuracy,  
reproducibility and  
repeatability of  
results: also a  
matter of volume,  
and pressure

## Utmost flexibility assured by real multi-volume capability

In density measurement, the best accuracy is produced when the sample volume is matched to the measuring chamber of a gas pycnometer. The shape and characteristics of solid samples can sometimes make it almost impossible to match the optimal analytical conditions, especially if different types of materials have to be tested. Pycnomatic features five different sample chambers, ranging from four to one hundred cubic centimeters. The user can easily change the chamber volume to match the material under test. The Pycnomatic can keep in memory up to three complete calibration volumes sets for both reference and sample chambers.

## The right pressure resolution

Real density determination by gas displacement requires highly accurate measurement of the helium pressure in the sample chamber. Besides temperature stability during the analysis, accuracy and reproducibility of the results are directly related to the pressure reading resolution. Pycnomatic allows an extremely precise measurement of the helium pressure, providing a stability of  $\pm 0.002$  kPa. Pycnomatic features an absolute pressure transducer type, that ensures the continuous correction of atmospheric pressure changes during an experiment.





### **Built-in accurate temperature control**

- Avoids use of external circulation bath
- Fastest system stabilization
- Reduced analysis time
- Avoids repeated calibrations
- Permits density investigation at different temperatures
- Unrivalled reproducibility of density results

### **Built-in multi volume capability**

- Easy choice of the best configuration according to sample volume and nature
- Constant accuracy in a wide range of volumes
- No requirement for instrument modifications
- No requirement for continuous recalibrations

# Versatile Communicator

Effective data entry and display ensure fast and straightforward analysis and reporting

## Complete sample identification and reporting

The large backlit display (four lines by forty characters), together with the alphanumeric keyboard, enables simple and quick set-up and modification of all the analytical parameters. Furthermore, users can type into the sample information page a detailed description of the material under test including comments about the run. For the benefit of highly regulated laboratories all these information are then printed along with the sample results. All the analytical, calibration and communication/reporting parameters can be easily edited to optimize the performance.

## Streamlined, yet complete, data transfer

The Pycnomatic can be connected directly to a balance, a printer and a computer. The weighed sample mass is thus automatically transferred to the Pycnomatic as the sample weight reaches a stable value. The sample report is generated at the end of the experiment by direct output to a parallel printer or to the PC, in electronic format. Alternatively, reporting can be done later, as the Pycnomatic memorizes up to two complete experiments in the internal memory buffer.

### PYCNOMATIC - DENSITY MEASUREMENT REPORT

Sample Name : Cement powder  
Comment : Dried at 100°C in oven for 30 minutes  
  
Operator :  
Analysis start : 23.01.03 11:26  
Analysis end : 23.01.03 11:57  
Vessel Correction : 0.00000 cc  
Vessel ID no. : 1  
Vessel weight : 3.123000 g  
Total weight before : 31.80300 g  
Sample weight before : 28.68000 g  
Total weight after : 28.68000 g  
Sample weight after : 28.68000 g  
Weight difference : 0.00000 g

### ANALYTICAL PARAMETERS

Reference volume : 21.16887 cc ( l )  
Cell volume : 29.14182 cc  
Filler volume : 0.00000 cc  
Repeated analyses no. : 3  
Flow cleaning time : 60 sec  
Number of cleaning cycles : 3  
Sample cleaning time : 10 sec  
Atm stabilization time : 30 sec  
Restriction delta pressure : 150.000 kPa  
Equilibrium delta pressure : 0.010 kPa  
Equilibrium delta time : 10sec  
Standard deviation % : 0.003 %  
No. of good measurements : 3  
No. of max measurements : 100  
Temperature set : 20.00 °C

### RESULTS

Average Sample Volume : 9.51797 cc  
Volume Standard Deviation : 0.00027 cc  
% Standard Deviation on Volume : 0.00288 %  
Average Sample Density : 3.01325 g/cc  
Density Standard Deviation : 0.00009 g/cc  
% Standard Deviation on Density : 0.00288 %  
Average Sample Density after : 3.01325 g/cc

### MEASUREMENT RAW DATA

Patmh kPa	Prh kPa	Pch kPa	Temp °C	Volume cc	Aver. Vol cc	Aver. Dev. cc
100.440	201.056	152.652	19.99	9.51641	9.51641	0.00000
100.441	200.977	152.611	19.99	9.51696	9.51668	0.00039
100.441	200.974	152.610	19.99	9.51712	9.51683	0.00038
100.438	201.048	152.649	19.99	9.51790	9.51733	0.00051
100.436	200.970	152.606	19.99	9.51769	9.51757	0.00040
100.436	201.044	152.646	19.99	9.51856	9.51805	0.00046
100.436	200.966	152.606	19.99	9.51824	9.51816	0.00044
100.436	201.027	152.636	19.99	9.51735	9.51805	0.00063
100.436	201.028	152.638	19.99	9.51870	9.51810	0.00069
100.434	201.048	152.646	19.99	9.51755	9.51786	0.00073
100.430	201.308	152.778	19.99	9.51672	9.51765	0.00100
100.425	201.024	152.630	19.99	9.51817	9.51748	0.00073
100.423	201.042	152.637	19.99	9.51727	9.51738	0.00073
100.420	201.019	152.626	19.99	9.51914	9.51819	0.00094
100.418	201.019	152.626	19.99	9.51933	9.51858	0.00114
100.418	201.017	152.623	19.99	9.51824	9.51890	0.00058
100.419	201.024	152.628	19.99	9.51890	9.51882	0.00055
100.419	201.025	152.627	19.99	9.51784	9.51833	0.00054
100.419	201.360	152.802	19.99	9.51828	9.51834	0.00054
100.420	201.028	152.629	19.99	9.51778	9.51797	0.00027

## Features and Benefits

Fully integrated and automated temperature control	Calibrations and measurements are independent from room temperature variations. Fast thermal stability of sample. Avoid frequent recalibration. No need for an external circulation bath
Utmost precision in temperature control and pressure stabilization	Highly accurate and reproducible results
Real multi-volume analytical capacity	Delivers a constant level of accuracy and reproducibility, virtually independent from the sample volume
Easy and fast chamber volume exchange	Different density/weight materials can be tested in a short time frame with the best precision
Choice of different purging procedures (flow, pulses or vacuum)	System flexibility even allows to control the preparation cycle eliminating problems with difficult samples like damp powders
Large backlit display and comprehensive alphanumeric keyboard	Fast and easy accessibility to all the pages relevant to the analysis, calibration and instrument parameters. Detailed and comprehensive sample identification. No training is required for instrument use
Sample cell and reference volumes separated from the electronics	Unit can be installed in a glove box for use with radioactive samples
Three different communication ports to a PC, a balance and a printer	Saves time during sample preparation and report generation. simple data processing and data storage in electronic format
Progressive gas load, expansion and discharge	Improves speed in pressure stabilization, no need for filters to prevent powders dragging by pressure drop, thus reducing maintenance
Gas loaded first into reference chamber (high pressure) then expanded into sample chamber (low pressure)	Permits the analysis of foams or compressible samples avoiding possible material shrinkage



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## Specifications

<b>Standard sample chambers capacity</b>	About 20, 40 and 60 cc. (indicative maximum sample vessels volumes)
<b>Optional sample chambers capacity</b>	Extra Small (about 4 cc) and Extra Large (about 100 cc)
<b>Reference chamber volumes</b>	About 20, 40 and 60 cc (indicative calibrated reference chambers)
<b>Temperature control range</b>	From 18 to 35°C by a Peltier device, selectable by steps of 0.01°C
<b>Temperature resolution</b>	Internal reading: 0.001°C, displayed resolution of 0.01°C
<b>Temperature sensor types</b>	Three, PT100 type
<b>Temperature control stability</b>	+/- 0.01°C (in the above temperature control range and in typical operation conditions)
<b>Pressure transducer range</b>	From vacuum up to 250 kPa absolute reading
<b>Pressure transducer type</b>	Absolute, piezo-resistive sensor, temperature compensated, linearized
<b>Pressure displayed resolution</b>	0.001 kPa
<b>Pressure transducer stability</b>	+/- 0.002 kPa
<b>Purging procedures</b>	By continuous flow, gas pulses or vacuum
<b>Maximum cycles number per run</b>	100 (user's selectable)
<b>Calibration procedure</b>	Integrated, storing up to three sets of calibrated volumes
<b>Calibration method</b>	By certified stainless-steel spheres
<b>Memory capacity</b>	Up to two complete runs made of up to 100 cycles each
<b>Typical reproducibility</b>	Better than 0.01 % at 20°C on sample volume (evaluation on dry and thermally equilibrated samples, sample real volume filling at about 66 % of nominal vessel volume)
<b>Typical accuracy</b>	Better than 0.01 % at 20°C on sample volume (evaluation on dry and thermally equilibrated samples, sample real volume filling at about 66 % of nominal vessel volume)
<b>Communication ports</b>	Serial port to computer and parallel port to printer for reporting, serial port to balance
<b>External gas connections</b>	Gas-in port (research grade helium or nitrogen), direct gas-out port and gas-out through restriction.
<b>User's interface</b>	Backlit display 40 characters x 4 lines, alphanumeric keyboard
<b>Environment conditions</b>	Temperature: 15 to 30°C, humidity: 20 to 80% Rh
<b>Power supply</b>	100 - 240 VAC, 50/60 Hz, 240 VA
<b>Dimensions</b>	Width: 25 cm, height: 33 cm, depth: 45 cm
<b>Weight</b>	17 kg (model ATC)

**ISO 9001**  
DNV-CERT-00203-94-AQ

In line with our policy we reserve the right to change specifications without notice

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