

# Semi-Solid and Solid Density **Analyzers**

Ultrapyc Series



# The Ultrapyc Series:

## Ultra-Simple, Ultra-Precise

We understand that you handle many measurement technologies, sample types, and responsibilities during your laboratory workday. Instruments that have complicated analysis routines and clutter valuable workspace aren't welcome.

The Ultrapyc gas pycnometer series is the solution for you. We've combined decades of knowledge in producing fast, accurate, and reliable semi-solid and solid density measurement analyzers with groundbreaking innovations and a state-of-the-art graphical user interface to create the most user-friendly gas pycnometer on the market today.

Whether you analyze cements, pharmaceuticals, catalysts, ceramics, fine powders, polymers, foams, toothpaste, marmalade, paints, adhesives, drilling muds, or synthetic tissue, density measurement has never been more simple or more precise.



1

Sample is loaded into a chamber of known volume. The TruLock lid is closed and secured.

2

The system is then pressurized to a specified value with the analysis gas.

3

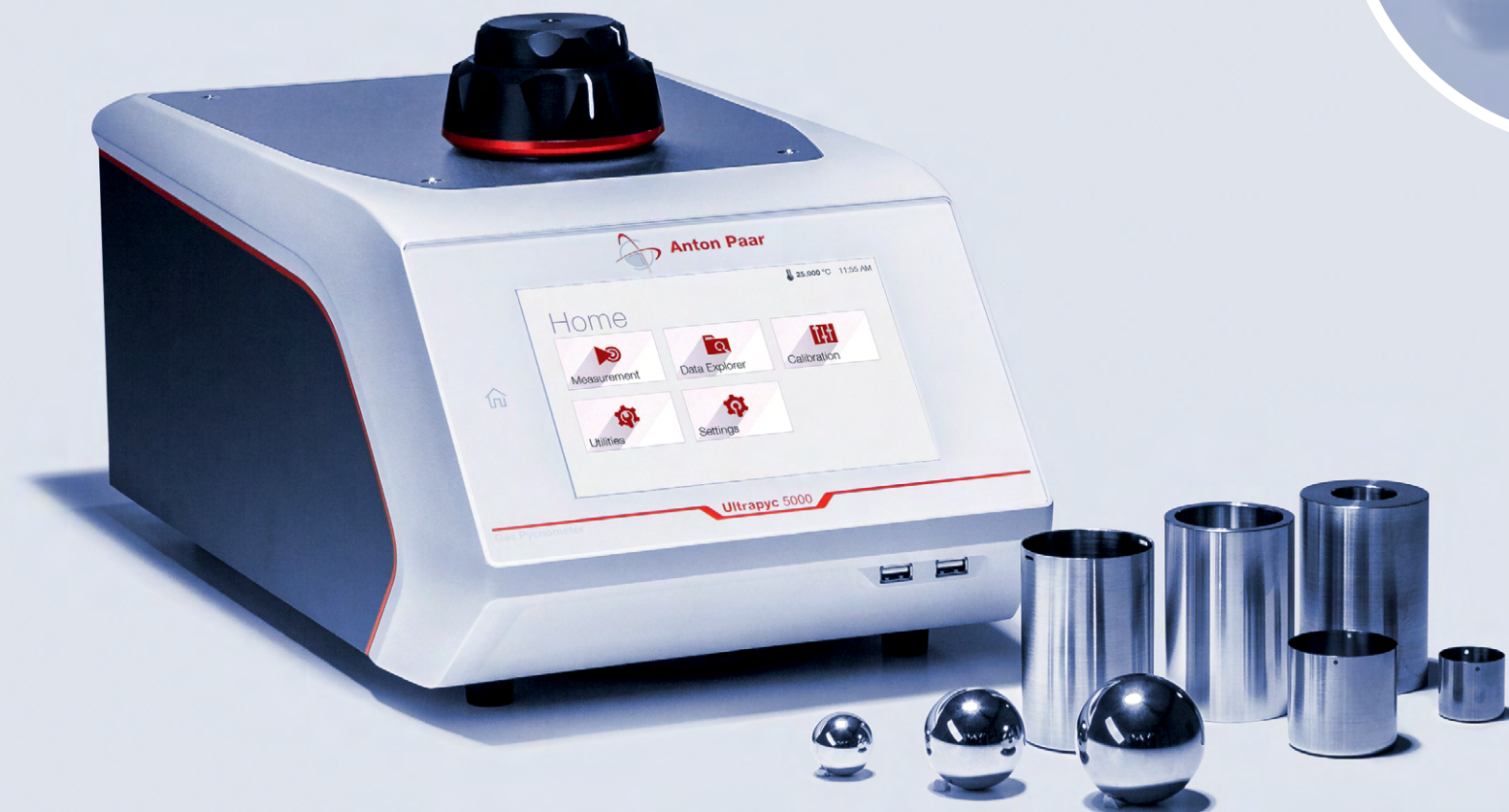
When the pressure equilibrates, a valve opens to allow the gas to expand into another chamber, the volume of which is also known.

4

From the resulting pressure drop, the volume is determined and the density calculated and reported.



# The Features That Make **Ultrapyc** Ultra-Simple and Ultra-Precise



←  
**DISPOSABLE CUPS**

SOFTWARE FOR  
YOUR PAPERLESS LAB:  
**AP CONNECT**



[www.anton-paar.com/apc](http://www.anton-paar.com/apc)

## **TruPyc technology provides unmatched accuracy across the widest range of sample amounts**

Matching the free space in the sample chamber to the volume of the reference chamber is the key to accurate gas pycnometry results. Unlike gas pycnometers that use a single reference chamber, the Ultrapyc series features multiple built-in reference chambers. Select your sample cell size and the Ultrapyc automatically uses the most appropriate chamber.

## **Precise, fast, and hassle-free temperature control\***

With built-in Peltier temperature control, external water baths are a thing of the past. With the broadest temperature range on the market (3 °C to 50 °C), Ultrapyc 5000 pycnometers ensure quick temperature stabilization. With Peltier temperature control, your samples are always measured at precisely the right temperatures, no matter your environmental conditions.

## **PowderProtect mode offers bidirectionality and eliminates contamination**

Using the standard “sample first” expansion direction ensures control over the maximum pressure to which the sample is exposed during the measurement. Switching to PowderProtect mode reverses expansion direction to “reference first,” and eliminates the possibility of contaminating your instrument with fine powders or slurries’ vapors and fumes.

## **An intuitive user interface for simple instrument control**

With a 7-inch touchscreen, the Ultrapyc has a user interface similar to that of a smartphone. The graphical overview of the measurement keeps you informed of temperature, pressure, valve status, and preliminary results at all times. Seeing reports on the touchscreen is easy and doesn’t require computers to be used, which saves you precious lab bench space.

## **Disposable cups to measure sticky and hard-to-clean samples quickly and simply**

Disposable aluminum cups expand the capabilities of the Ultrapyc series for measuring semi-solids. They dramatically increase analysis throughput and provide the flexibility to measure densities of cured materials and hard-to-clean samples with single-use convenience.

## **Data connectivity**

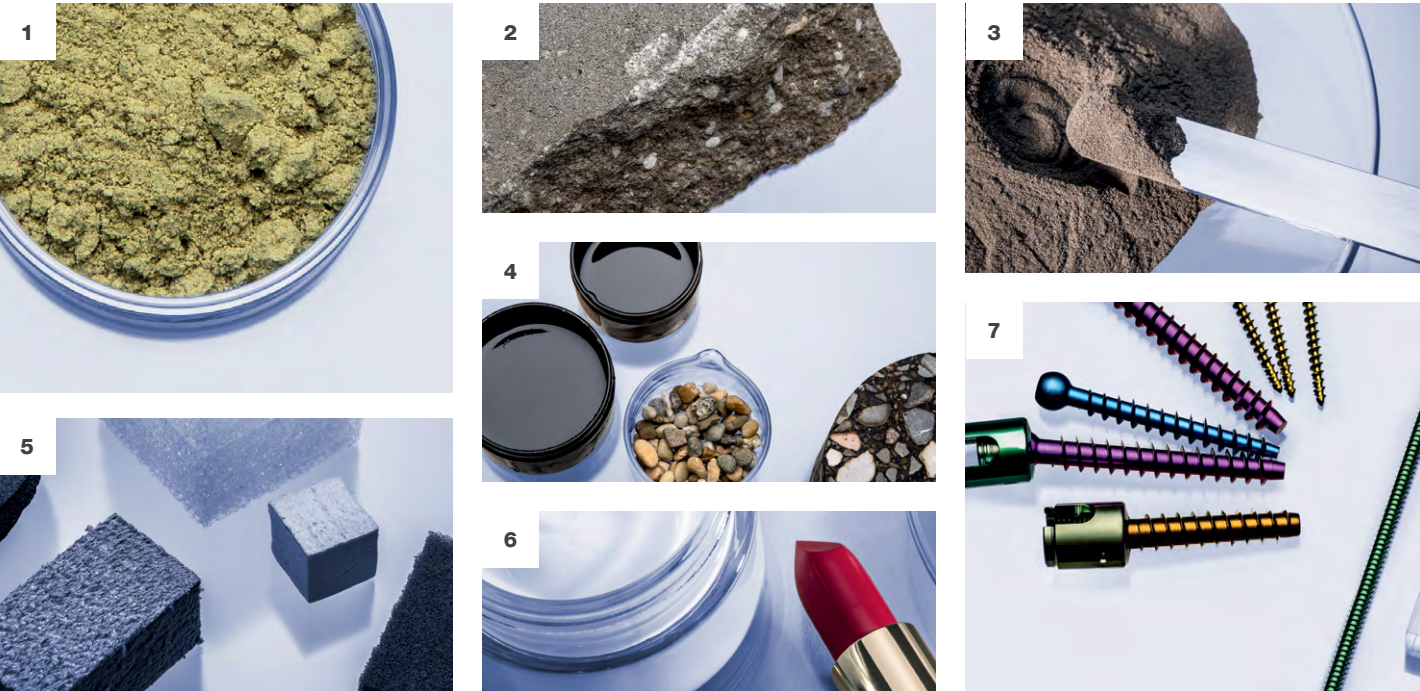
Eliminate the risk of transcription errors that can occur when manually entering data by connecting the Ultrapyc directly to a balance with RS232 communication. Additionally, AP Connect enables the Ultrapyc instrument to communicate with a personal computer for convenient data storage and management.

\*Only available on Ultrapyc 5000 models



# Industry Solutions

Gas pycnometry is used extensively for determining the density of solids and semi-solids. The Ultrapyc series complies with many ASTM, ISO, MIPF, and JIS standard test methods that are used across a wide variety of industries.



- 1 Powder coatings and dried film coatings**

The crystallinity of plastics and the true density of dry pigments are monitored by gas pycnometry to better understand the mechanical behavior of these materials. In addition, gas pycnometry can help determine the nonvolatile matter in dried coating films.
- 2 Cements**

The true density of cement is used for the accurate calculation of powder characteristics. Measured after setup time, the insights gained are important for formation and stability determination.
- 3 Ceramics and catalysts**

Density values are used in the development, manufacturing, and troubleshooting of refractory materials to confirm that the desired crystal phase is present and closed porosity is absent.
- 4 Minerals and hydrocarbons**

Gas pycnometry is the primary technique used to quickly assess the composition of minerals and hydrocarbon derivatives.

- 5 Polymers and foams**

Gas pycnometry is widely used to characterize the relative amounts of crystalline and amorphous phases within polymer materials. This technique is also used to assess the open cell content of foam materials to predict their performance as insulators or as sound- or collision-dampening materials.
- 6 Cosmetics**

The density of cosmetics and personal care materials is used for formulation quality control and is important in the packaging of the final product.

- 7 Metallurgy**

The true density of complex metal shapes is used to track the purity of raw materials or the presence of open or closed pores throughout processing.

	Ultrapyc 3000	Ultrapyc 5000	Ultrapyc 5000 Foam	Ultrapyc 5000 Micro
	↓ The base model	↓ Includes built-in temperature control and PowderProtect mode	↓ Includes built-in temperature control, PowderProtect mode, and foam mode	↓ Includes built-in temperature control and PowderProtect mode
Large cell: 135 cm³	Accuracy: 0.02 %   Repeatability: 0.01 %			-
Medium cell: 50 cm³	Accuracy: 0.02 %   Repeatability: 0.01 %			-
Small cell: 10 cm³	Accuracy: 0.03 %   Repeatability: 0.015 %			-
Micro cell: 4.5 cm³	-			Accuracy: 0.10 % Repeatability: 0.05 %
Meso cell: 1.8 cm³	-			Accuracy: 0.30 % Repeatability: 0.15 %
Nano cell: 0.25 cm³	-			Accuracy: 1.00 % Repeatability: 0.50 %
Preparation modes	Flow, pulse	Flow, pulse, vacuum		
Pressure reading resolution	Digital pressure display resolution of 0.0001 psi (0.00001 bar)			
Connections	4 USB ports			

INSTRUMENT DIMENSIONS			
Weight	10 kg (22 lbs)		
W x D x H	27 cm x 48 cm x 25 cm (11 in x 19 in x 10 in)		
Built-in temperature range	-	3 °C to 50 °C with stability better than ±0.02 °C	

Available connectivity to a balance using RS232 communication | Results available on screen, via a printer, or electronically in text and pdf formats | All units calibrated at the factory using NIST-traceable spheres | A pressurized gas source up to 20 psi (1.4 bar) and a standard power outlet are required for operation | Volume fill of the sample cell can affect density accuracy and repeatability results. For best results, use the volumes recommended in the Ultrapyc user's manual.



SELECTED INTERNATIONAL STANDARDS			
ASTM B923	Metal Powders	ASTM D5550	Soils
ASTM C110	Cements	ASTM D5965	Coating Powders
ASTM C2604	Refractories	ASTM D6093	Coatings
ASTM D2638	Carbon (Petroleum coke)	ASTM D6226	Rigid Foams
ASTM D4892	Carbon (Solid pitch)	USP 699	Pharmaceuticals

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