Anton Paar

Density and Concentration Meters Generation M

DMA 4100/4500/5000 M

::: Unique Density & Concentration Meters

DMA Generation M density meters deliver real accuracy based on real experience – and simply feel better to work with.

Measuring your sample's density and concentration is a fairly simple push-button procedure – and it should be. However, really reliable results depend on several factors, from filling to usability to viscosity to temperature… and the DMA Generation M series masters these factors for you.

Your benefit? Our experience. Density meters have been Anton Paar's point of pride ever since we produced the world's first digital density meter in 1967. Decades of refinement later, this engineering quality has resulted in the world's most accurate density meter, DMA 5000 M. However, we believe real accuracy transcends the race for digits. What counts is what you need: convenient, safe operation and a truly successful working day.

Handling a DMA Generation M density meter simply feels better. With the latest models' new look and feel, including a 10.4'' touchscreen, as well as outstanding user safety features from filling control all the way to unique viscosity corrections, DMA Generation M provides you with all the accuracy minus all the work.

TRUTH FEELS BETTER

With density meters like these at your fingertips, truth really does feel better.

Good Look - Better Feel - Best Performance

U-View™

Check the sample filling process via a high-quality image of the glass cell on the screen or recall stored images of the entire filled-in sample at any later time. The stored images allow you to later verify correct sample filling and measurements, particularly when using automatic sampling systems. Print results and the U-View™ picture as PDF files that are sent to your LIMS.

Ease of use

Perform your tasks quickly and efficiently with the large and easily operated touchscreen. Open your favorite menu dialogs directly from the main screen using the quick access area. Assign different user levels to prevent any accidental changes. Symbols on the screen show you vital information, such as measurements in progress, FillingCheck™ alerts and the current status of an automatic sample changer or measuring module.

PCAP touchscreen

The 10.4” touchscreen uses projected capacitive technology (PCT/PCAP) for a state-of-the-art user experience. Operation is easy, even when wearing gloves. One main screen tells you what you need to know even from a distance, thanks to adaptable font sizes.

ThermoBalance™

ThermoBalance™ eliminates the need for multi-temperature calibrations and allows you to quickly perform accurate measurements at very different temperatures. The compact mechanical setup allows for the compensation of drifts due to temperature stress, even when samples are filled at temperatures very different from the measuring temperature, and provides stable readings over extended periods of time. DMA Generation M density meters are the only instruments to provide you with all of these capabilities. ThermoBalance™ guarantees long-term stability for temperature scans.

Adaptable configurations

Integrate the flexible DMA Generation M into your lab environment without difficulty. Add a sample changer or any of the various additional measuring modules to increase the efficiency of your measuring processes. Use a mouse, bar code reader or an external keyboard for sample identification or if you are working in a harsh environment.

Convenient data handling

Store your results in the instrument for as long as you want and use its various interfaces for data exports via USB flash drive, printer or Ethernet services. Reports are provided in popular formats such as PDF, TXT and XLS.

Automatic air adjustments

Rest assured that the local air pressure for air adjustments is correctly accounted for due to the built-in atmospheric pressure sensor.

FillingCheck™

Your density meter automatically detects filling errors or bubbles in the sample in real time, alerts you and documents the incident. You can be sure of correct sample filling, whatever the conditions.

Viscosity correction

The sample’s viscosity causes damping of the oscillating U-Tube, which would normally reduce the achievable repeatability and accuracy of the measurement. To avoid this effect, DMA Generation M meters automatically correct the viscosity influence on the measured density over the full range of densities, viscosities and temperatures. Systematic errors due to the sample’s nature are eliminated.

Results of Worldwide Value

Countless analytical methods prevail in today's quality and production control: One of the easiest, fastest and most significant is density measurement. It requires very little sample, does not change the sample's composition and consumes no chemicals. Density measurement determines concentrations from 0 % to 100 % with the utmost precision and allows you to always offer first-rate product quality.

Beverages

"DMA has been established in our industry for years."

- Determination of sugar content (<0.01 °Brix, g/L), alcohol content (<0.01 %v/v, <0.02 °Proof)
- Determination of extract content (°Plato, °Balling)
- Beer quality control
- Quality control of soft drinks (<0.01 °Brix)

Anton Paar's long standing experience as a measuring specialist for the beverage industry (soft drinks, beer, spirits, etc.) and the highly precise results DMA delivers in next to no time have established it as the benchmark for this field.

Standards:

- AOAC, international
- OIV, international
- ASBC, TTB (USA)
- MEBAK, EBC international

Pharma & Cosmetics

"DMA complies with our quality guidelines."

- Quality control of raw materials and final products
- Determination of specific gravity and density (g/cm^3, g/mL) of medicinal formulations
- Filling volume determination

DMA meets the strict regulations in the pharmaceutical and cosmetic industries – with electronic signatures, various user levels and internal write protection.

Standards:

- European and US Pharmacopoeia
- 21CFR part 11
- cGLP/GMP

Petroleum

"DMA is absolutely ideal for our highly viscous samples."

- Quality control of raw materials and final products (API, kg/m^3)
- Quality control of additives
- Blending checks
- Density of gases

A thorough, fast viscosity correction and a measuring range up to 95 °C make DMA the perfect density meter for highly viscous samples such as bitumen, heavy fuel oil, or crude oil.

Standards:

- DIN 51757, ISO 12185
- ASTM D 1250, ASTM D 4052, ASTM D 5002, ASTM D 5931

Flavors & Fragrances

"Small sample volume requirements are ideal for us, of course."

- Quality control of raw materials and final products (g/cm^3)
- Specification checks
- Filling volume determination

Since DMA only requires a minimal amount of expensive sample for its density measurement in order to deliver highly precise results after very short measuring times, the instrument is highly valued in the flavors & fragrances industry.

Chemicals

"DMA is astoundingly resistant – an absolute must for our industry."

- Quality control of raw materials (°Baumé, g/cm^3, kg/m^3) and final products
- Concentration determination of acids and bases (%w/w, %m/m, mol/L)
- Solids content determination of dispersions
- Reaction process control

DMA is renowned worldwide for its robustness. The chemical industry relies on it. Apart from this, all common density/concentration tables are stored in the instrument, and new substances are easily programmed as a table or a polynomial. The use of DMA has considerably reduced the workload in the chemical industry.

Standards:

- ISO 2811-3, ISO 15212

Research and Development

"The temperature scan saves us a lot of time."

- Determination of partial specific volume
- Determination of density gradient for ultracentrifuging
- Density/temperature profile
- Determination of molarity (mol/L) and normality (N)

The main reasons for R&D departments to choose DMA are the great accuracy, the small sample volume requirement and the temperature scan by means of the reference oscillator: The automatic temperature change right down to one-hundredth-steps guarantees easy, time-saving work.

Standards:

- ISO 15212

Biofuels

"In short: optimal quality control for an optimal product."

- Quality control of raw materials and final products
- Production control (%v/v, °Proof, g/cm^3)
- Blending checks

Bioethanol producers use DMA because its unprecedented accuracy assures considerable savings. The biodiesel industry chooses the instrument for its robustness and thorough, fast viscosity correction.

Standards:

- EN 14214, ISO 12185
- ASTM D 4806, ASTM D 4052

Calibration Offices, Testing Agencies

"We have been using DMA for more than twenty years."

- Determination of alcohol content (%v/v, °Proof) for fiscal reasons
- Filling volume determination
- Stability monitoring of density standards

With density measurement results as accurate as up to 0.000005 g/cm^3, a temperature accuracy of 0.01 °C and a sample volume requirement of only 1 mL, DMA is the high-precision reference instrument with the least sample consumption for calibration offices.

Standards:

- AOAC, international
- OIV, international
- ASBC, TTB (USA)
- HM Revenue and Customs

A Range of Options

Automation

The Plug and Play sample changers are designed to fit into your density meter, to save space on your lab bench. Anton Paar's sample changers manage sample viscosities up to 35,000 mPa.s. Select an automatic sample changer according to your sample's characteristics, plug it in and the density meter automatically recognizes it. Rely on regular checks and let the optional bar code reader scan the labels for you. While your system automatically measures large numbers of samples, you are free to perform other important tasks.

FillingCheck™ will alert you if any problem has occurred, while U-View™ allows you to verify results at any later time. Use the sample list to assign a separate method to each sample if required. You can interrupt the pre-configured sequence to insert a priority sample whenever you want, for unprecedented flexibility and efficiency.

Modular extensions

Expand your DMA Generation M density meter with CO_2, O_2, color, turbidity, pH, diet concentration or alcohol measuring modules as well as modules for viscosity or refractive index according to your individual requirements.

Further safety measures

A Pharma Qualification and Validation Package is also available, containing all relevant documents for instrument qualification and validation in pharmaceutical companies. For added security and long-term stability, you can use the optional MKT 50 thermometer for quick temperature checks (0.001 K).

Accessories

Aerosol Adapter

Using the optional aerosol adapter, you can measure volatile liquids directly from aerosol cans. The adapter fills the high-precision instruments directly from the can, without bubbles and under safe conditions.

Heating Attachment

The heating attachment is specifically designed for use with DMA Generation M density meters. It heats the filling adapters, allowing for easy injection of samples that are commonly solid or highly viscous at room temperature.

Your advantage:

Service

In-house ISO/IEC 17025 calibration service

Anton Paar is officially accredited to calibrate density meters according to ISO/IEC 17025.

Custom-tailored after-sales service for you

Our sales and service network of trained engineers is dedicated to customer support. The Anton Paar service team is always available – simply place your call.

Density standards provided by Anton Paar

Ultrapure water standards are manufactured by Anton Paar and available upon request to guarantee high quality density adjustments. Other liquid density standards with different densities and uncertainties are available on request.

Technology

Anton Paar's DMA density meters combine the groundbreaking oscillating U-tube principle, and an integrated reference oscillator, highly accurate platinum thermometers and a full-range viscosity correction for exceptional measurement performance. Here's how the measurement works:

The oscillating U-tube sensor is filled with 1 mL of sample. The instrument electronically excites the U-tube sensor to simultaneously oscillate at the fundamental resonant frequency and its harmonics. The oscillation characteristics are measured, with the integrated reference oscillator providing the pace. The reference oscillator is positioned in close thermal contact with the oscillating U-tube. This unique positioning enables the reference oscillator to compensate for all drifts arising from temperature stress. The density is determined with the utmost accuracy based on these measurements, including a correction of the viscosity influence.

Specifications

		DMA 4100 M	DMA 4500 M	DMA 5000 M
Measuring range	**Density** **Temperature** **Pressure**	0 to 3 g/cm^3 0 to 95 °C (0 to 203 °F) 0 to 10 bar (0 to 145 psi)		
Accuracy**	**Density** **Temperature**	0.0001 g/cm^3 0.05 °C (0.09 °F)	0.00005 g/cm^3 0.03 °C (0.05 °F)	0.000005 g/cm^3 0.01 °C (0.02 °F)
Precision **Repeatability std. dev**	**Density** **Temperature**	0.00005 g/cm^3 0.02 °C (0.04 °F)	0.00001 g/cm^3 0.01 °C (0.02 °F)	0.000001 g/cm^3 0.001 °C (0.002 °F)
Typical measuring time/sample*		30 s		40 s
U-View™		Yes		
FillingCheck™		Yes		
ThermoBalance™		Yes		
Full range viscosity correction		Yes		
Minimal sample volume		Approx. 1 mL		
Wetted materials		PTFE, borosilicate glass		
Dimensions (L x W x H)		495 mm x 330 mm x 230 mm (19.5 x 13 x 9.1 inches)		
Weight		22.5 kg (49.6 lbs)		
Power supply		AC 100 to 240 V; 50 to 60 Hz; 190 VA		
Display		10.4 inches, TFT PCAP touchscreen 640 x 480 Px		
Controls		Touchscreen, optional keyboard, mouse and bar code reader		
Communication interfaces		4 x USB, Ethernet, VGA, CAN, 2 x S-Bus, RS-232		
Internal storage		1000 measuring results (ring buffer option)		
Special functions		Temperature scan; Built-in pressure sensor		Temperature scan; Adjustment at high density/viscosity; Built-in pressure sensor
Modularity & upgrades		Automatic sample changers, measurement of viscosity, refractive index, alcohol, CO_2 O_2		
Optional accessories		Aerosol Adapter, Heating Attachment		

* After temperature equilibration
** This is valid under ideal measuring and sample conditions only.

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