Particle size

Zeta potential

Molecular weight

Zetasizer nano zs

ZS

The ultimate in desktop particle characterization

detailed specification from www.malvern.com/zetasizernano

Malvern

Zetasizer nano zs

Advanced technology made easy

The Zetasizer Nano ZS brings you the practicality of a maintenance-free system with the versatility of multi-parameter measurements in a single compact unit.

Particle Size

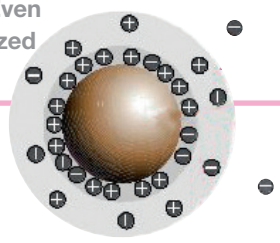
Non-invasive back scatter (NIBS®) technology takes particle sizing to new levels of sensitivity in the 0.6nm to 8.9 micron range. The new Zetasizer Nano ZS is the choice for the accurate, reliable and repeatable size analysis of particles and molecules in solution.

- Little or no dilution necessary
- Colloid size and size distribution
- Pharmaceuticals
- Nanoparticles
- Emulsions

Zeta potential of particles and surfaces

The new Zetasizer Nano ZS offers the highest ever sensitivity, accuracy and resolution for the measurement of zeta potential of particles and surfaces. This is achieved by a combination of laser Doppler velocimetry and phase analysis light scattering (PALS) in Malvern's patented M3-PALS technique. Even samples of very low mobility can be analyzed and their mobility distributions calculated.

- Surface zeta potential
- Formulation stability
- Water treatment
- Pigment performance
- Impurity determination



Chromatography flow-mode

Connect the Zetasizer Nano to your chromatography system for use as a dynamic light scattering detector.
The size and intensity are plotted in real time as the material elutes from the column.
Averages, peak positions and estimated molecular weights of each peak are calculated automatically at the end of the measurement.

- Only seconds to change from batch to flow mode
- No column calibration
- Measure the size of each population within the sample and separate protein oligomers
- Compatible with any SEC system

Molecular weight

Using static light scattering (SLS) and the classical Debye plot, the molecular weight of random coiled polymers up to 5×10^5 Da as well as globular polymers and proteins up to 2×10^7 Da can be determined without the necessity for multi-angle measurements.

- Protein crystal screening
- 2nd virial coefficient determination
- Oligomer identification
- Protein-melting point

Advanced technology made easy

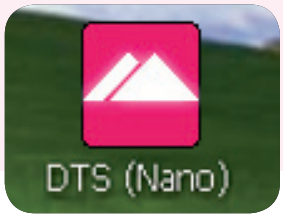
How easy?

- Choose from a range of cuvettes, volume as low as 12µL
- Unique maintenance-free zeta potential cell
- No alignment, calibration or maintenance required
- Zeta potential and size can be measured in the same cell

1

Power up the Zetasizer Nano ZS and launch the software

An automatic complete system self-check ensures that all components are ready for operation.



2

Fill the size or zeta potential cuvette

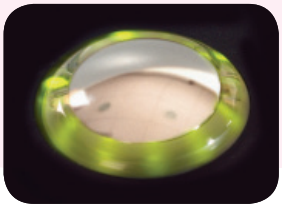
The low volume, folded capillary cell is the first ever for zeta potential which does not require cleaning.

To eliminate cross-contamination; fill it, measure and, instead of cleaning, use a new one.

3

Load the cuvette

Simply insert the cuvette, close the lid and it's ready to go.



4

Run the measurement

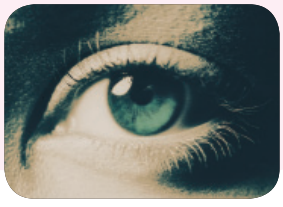
From the menu, select the standard operating procedure (SOP) you need or set your own conditions and click the 'start' button.

5

View the results

Predefined reports make reading, comparing and analyzing the results straightforward.

Remove the cuvette and you are ready for the next sample.



That's how easy

Meeting your needs

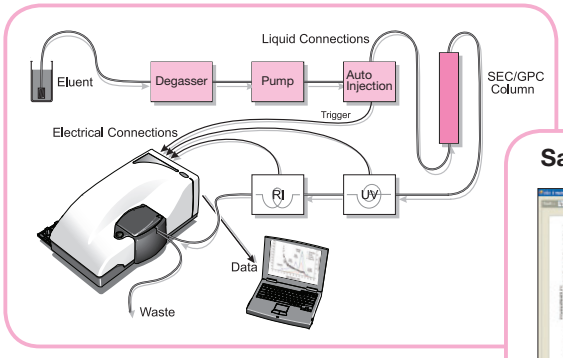
At Malvern we strive for improvement in every instrument we design and produce. This process is made possible because we continually ask our customers what they think and what they need before turning those wishes into reality.

You asked for	We give you
The ability to measure zeta potential at high concentrations and the zeta potential of material surfaces	New accessories to extend the sample concentration range and a simple to use accessory to measure surface zeta potential
Simple operation	Standard Operating Procedures (SOP) which ensures that measurements can be repeated using exactly the same parameters to give confidence in the result
Low volume sample measurement (for valuable proteins and biopolymer samples)	A comprehensive range of cells with volumes as small as 12µL
Chromatography connectivity	Flow-mode – the ability to connect to any SEC/GPC chromatography system and input two external analog detector signals to display in the software
Size measurement at low concentrations	NIBS (non-invasive back scatter) technology built in for increased particle sizing sensitivity and to make it possible to characterize proteins and polymers <1nm in diameter and with molecular weights as low as 342 Da
Simplified sample preparation – especially for emulsions	Instruments which can analyze sample size with little or no dilution
Elimination of sample cross contamination and no need to clean cell or electrodes	Unique maintenance-free folded capillary cell. The world's first disposable zeta potential capillary cell
Ability to measure zeta potential in high salt systems and non-aqueous media	Patented M3-PALS (phase analysis light scattering) technology which allows operators to improve resolution as well as automating the process of measurement
Help with data interpretation	Quality reports that give an assessment of the data and the first Expert Advice System incorporated into a light scattering instrument to give real time advice about data quality

The Zetasizer as a chromatography detector!

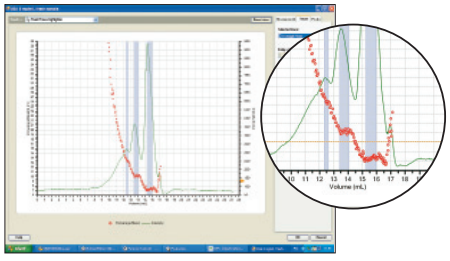
No calibration required for your column... use the Zetasizer as an in-line detector with any SEC system… and the software makes it all so easy.

For the majority of protein separations in aqueous media, no parameter input is required. Installation is simplicity itself, just connect the Zetasizer Nano to the flow path.



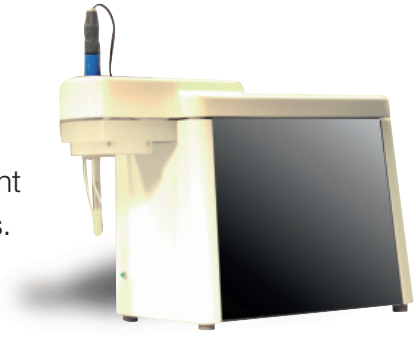
For other chromatography options, see Malvern's Viscotek range

Sample measurement view



- Input up to two external detectors (e.g. RI and UV)
- Remote start capability to synchronise with an autosampler
- Switch between batch and flow in seconds
- Overlay traces from all detectors
- Continuous output of size and intensity

Autotitrator



While zeta potential alone is often used to make comparisons between materials and formulations, measuring zeta potential as a function of pH, conductivity or concentration of an additive, provides much greater insight into the processes involved in stabilizing or flocculating disperse systems.

Using the MPT-2 autotitrator these measurements can be made automatically using 4mL of sample or 10mL if pH is required.

Operation is fully automated and protocols can be specified as part of standard operating procedures.

SV-10 Viscometer accessory

An accurate size measurement requires an accurate dispersant viscosity

- **The SV-10 has a 1% accuracy over its whole range**
- **Measurements take 15 seconds**
- **Exceptionally easy to use, just dip the probes in the sample and press start**
- **Compatible with all fluids as sensors are gold plated**

Autodegasser accessory

- **Simplify the use of the MPT-2 with the autodegasser accessory**
- **'Fit and forget' operation**

Cell options

Cuvettes for size measurement

A wide range of disposable and glass and quartz cuvettes with volumes as low as 12µL for flow and batch applications

Disposable cells

- **From 1mL down to 40µL volumes**
- **High optical quality**

Glass and quartz cells

- **From 1mL down to 12µL volumes**
- **Flow cell for chromatography measurements**

Cuvettes for zeta potential

Disposable capillary cell

- **No maintenance – use for a series of experiments then discard**
- **Cross contamination eliminated**
- **750µL (<50µL sample using diffusion barrier technique)**

Universal 'Dip' cell

- **Uses inexpensive polystyrene cuvettes**
- **Can be used for both aqueous and non-polar dispersants such as hydrocarbons**

High concentration cell

- **Offers the maximum concentration zeta potential capability with the Zetasizer Nano**

Surface zeta potential cell

- **Measurement of zeta potential of surfaces and materials adsorbed to surfaces**
- **Measure effect on zeta potential of environment, e.g pH, ion concentration, or material adsorption to surfaces, e.g. proteins, surfactants**

Cell type – Zeta potential	Dispersant	Volume	Re-use	Flow cell	Size
Disposable Folded capillary	Aqueous	<50µL sample 750µL dispersant		●	●*
Dip cell	Any	750µL	●		●*
High concentration 40%w/v**	Aqueous	150µL	●	●	●*
Surface zeta potential	Aqueous	1200µL	●		●*

* Sequential size measurement with Zetasizer Nano ZS only
** Sample dependent

Software to make it happen

The excellence of the Zetasizer Nano ZS hardware can only be fully utilised with similarly advanced software. The operating software provides the flexibility required for measurement design and data analysis while retaining simplicity of operation.

The software is packed with features to aid the new and experienced user alike to get the most out of the system and give confidence in the data.

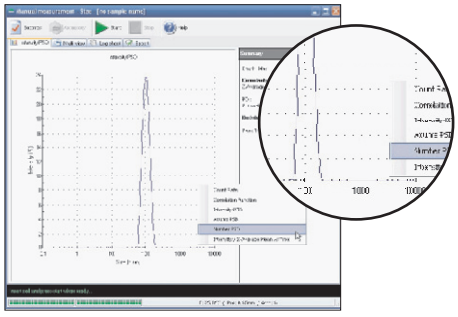
Quality reports provide an overview of the quality of the data and results – and advice about how to improve the measurement.

An 'Expert Advice System' running in real time, examines the data from single and repeat measurements, and informs the user as the measurement progresses, an 'Expert standing with you' at all times.

A high degree of automation in the measurement process ensures simplicity of operation and avoids inappropriate settings.

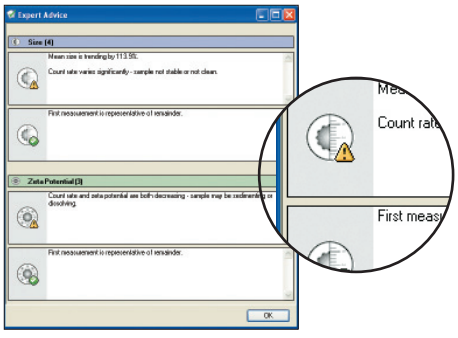
- **fully automated operation – for ease of use**
- **SOPs – for repeatability between operators, systems and sites**
- **custom report generator – to meet the requirements of every laboratory**
- **temperature trend analysis**
- **time trend analysis**
- **selected parameter trend analysis**
- **overplotting of results for direct comparison**
- **full range of statistical plots**

Sample measurement view



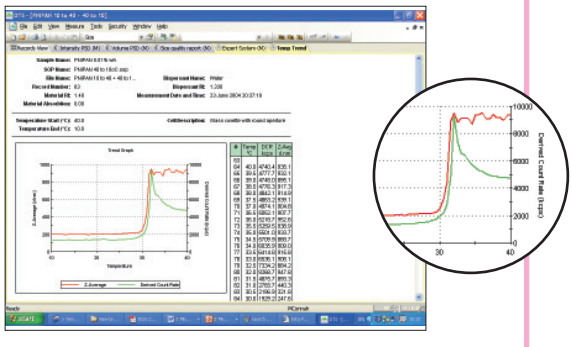
During data acquisition, status messages keep the operator informed of progress and an evolving distribution is displayed

Expert System display



The 'Expert System' continually monitors data quality and gives continuing information as the measurement progresses

Trend plot



Data can be plotted as a function of a wide range of parameters to investigate trends

Specifications

Zetasizer Nano ZS

	Parameters measured	Materials
	Hydrodynamic size, zeta potential and molecular weight	Particle dispersions, emulsions, molecular solutions and flat surfaces
Size	Size range maximum (diameter)	0.3nm - 10 microns*
	Minimum sample volume	12µL
	Concentration range	Min. 0.1mg/mL 15kDa protein, 0.1ppm of 60nm polystyrene latex, Max.40%w/v†
	Measurement angles	12.8° and 175° (water as sample dispersant)
Zeta potential	Size range suitable for measurement (diam)	Min. 3.8nm, max. 100 microns†
	Mobility range	Min. zero, no effective maximum
	Zeta potential range	No effective limitations
	Maximum sample concentration	40%w/v†
	Minimum sample volume	150µL (<50µL using diffusion barrier technique)
	Maximum sample conductivity	200mS/cm
	Signal processing	M3-PALS
Molecular weight	Molecular weight range (estimated from hydrodynamic diameter)	342Da to 2 x 10^7Da†
	Molecular weight range (calculated using Debye plot)	980Da to 2 x 10^7Da†
	Minimum sample volume	12µL
General	Temperature control range	0°C - 90°C +/- 0.1°C, 120°C option**
	Condensation control	Purge facility using dry air
	Standard laser	4mW He-Ne, 632.8nm
	Correlator	Min. sample time 25ns, max. delay time 8000s. Max. 4000 channels
Accessories	MPT-2 Autotitrator	pH, conductivity or additive titration
	Dip cell	Reusable zeta potential measurement cell
	High concentration zeta potential cell	Max. 40% w/v
	Surface zeta potential cell	Sample size 5mm x 4mm x 1mm thick (maximum thickness)
	SV-10 viscometer, viscosity range	0.3 - 10,000mPa.s
	Auto-degasser for MPT-2	3 channel
Options	High power laser/alternative wavelength	50mW, 532nm
	High temperature option	Extends upper temperature range to 120°C
	Narrow band filters, 633nm or 532nm	Improves signal for samples that fluoresce
	Flow mode option	Enables use as a detector for SEC systems
	21 CFR part 11 software option	Enables an operating mode that assists with ER/ES compliance
	Research software option	Advanced system utilities
Patents granted	Non-Invasive Back-Scatter (NIBS)	EP 0 884 580, DE 19725211, US 6016195, JP 2911877
	High and Low frequency electrophoresis - Mixed mode measurement (M3)	UK 2361772, EP1154266, US 09/843339, JP 2001-134510
System compliance	CE certification	Product laser class 1, EN 60825-1:2001 and CDRH
System	Dimensions, weight, power	320mm, 600mm, 260mm (W,D,H), 21kg, 100W
Notes	* Peak mode range (diameter), 0.6nm - 8.9 microns, sample dependent ** Temperature accuracy, 0.1°C at 25°C, 0.2°C at 0°C and 0.5°C at 90°C, 1°C at 120°C † Sample dependent	

Malvern Instruments Limited
Grovewood Road • Malvern •
Worcestershire • UK • WR14 1XZ
Tel: +44 (0)1684 892456
Fax: +44 (0)1684 892789

Malvern Instruments Worldwide
Sales and service centres in over 50 countries.
For details visit www.malvern.com/contact

Zetasizer nano zs

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