

Particle size



Zeta potential



Molecular weight



Zetasizer

nano ZS

ZS

The **ultimate** in desktop particle characterization

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 6 micron range. The new Zetasizer Nano ZS is the choice for the accurate, reliable and repeatable size analysis of particles and molecules in solution.

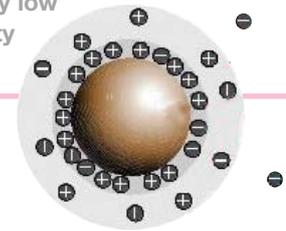
- Little or no dilution necessary
- Colloid size and size distribution
- Pharmaceuticals
- Nanoparticles
- Emulsions



## Zeta potential

The new Zetasizer Nano ZS offers the highest ever sensitivity, accuracy and resolution for the measurement of zeta potential. 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.

- Emulsion stability
- Formulation stability
- Water treatment
- Pigment performance
- Impurity determination



## Chromatography flow-mode

Connect the Zetasizer Nano to your chromatography system for use as an absolute light scattering detector. Just position after the last detector in your SEC/GPC system. The size and intensity are plotted in real time as the material is eluted from the column. Averages, peak positions and 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
- Determine oligomeric state of each eluted peak
- Quantify polydispersity
- 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  $5 \times 10^5$  Da as well as globular polymers and proteins up to  $2 \times 10^7$  Da can be determined without the necessity for multi-angle measurements.

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

### 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.



#### 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.

# 2

# 3

#### Load the cuvette

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



#### Run the measurement

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

# 4

# 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

*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 12 $\mu$ L

*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 1000 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

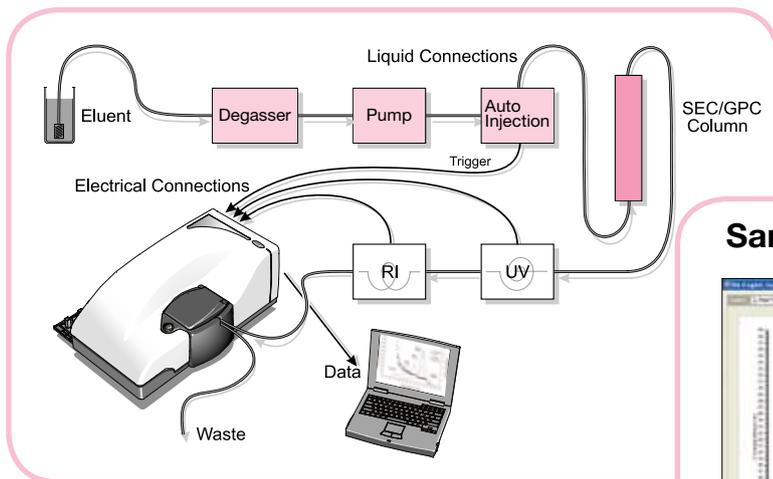
*Help with data interpretation*

Quality reports that give an assessment of the data and the first Expert System incorporated into a light scattering instrument to give real time advice about data quality

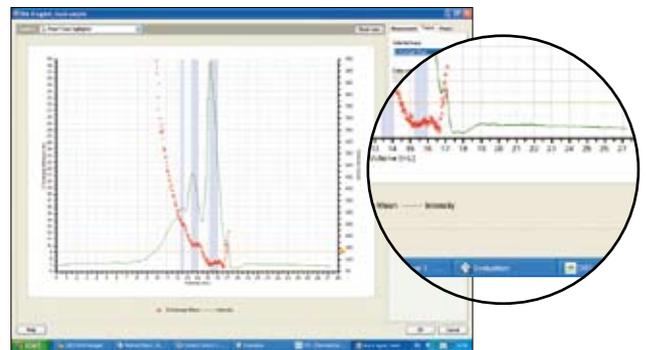
## The Zetasizer as a chromatography detector! ASEC = Absolute Size Exclusion Chromatography

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 as the last detector.



### Sample measurement view



Report showing peaks automatically detected and quantified

- Input up to two external detectors (e.g. refractive index RI, ultraviolet UV,...)
- Remote start capability, just start the SEC and the rest is automated
- Simple to install, just connect the Zetasizer as the last detector
- Switch between batch and flow measurements by just changing the cuvette – in seconds

- Automatically identify eluted peaks without calibration, expressed as size or molecular mass
- Overlay RI and UV traces with the Zetasizer Nano output
- ASEC does not rely on column calibration standards
- Continuous output of size and intensity

## Accessories and cell options

### 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 samples of less than 3mL, which allows comprehensive analysis of even scarce biological materials.

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

### Range of cuvettes for size, zeta potential and molecular weight

The range covers disposable cuvettes, glass for chemical compatibility, and low and micro volume for precious samples

#### Cuvettes for zeta potential

##### Disposable capillary cell

- No maintenance – use for a series of experiments then discard
- Cross contamination is eliminated

##### 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 capability with the Zetasizer Nano
- Lowest volume capability
- Construction using PEEK and solid palladium electrodes ensures chemical compatibility

#### Product selector guide

Cell type	Aqueous	Non-Aqueous	Volume	Re-usable	Titratable	Size	Comment
Disposable folded capillary cell	●		1.5ml		●	●	
Dip cell	●	●	>0.75ml	●		●	
High concentration cell	●		150µl	●	●	●	40% concentration (sample dependent)



#### Cuvettes for size

- Wide range of disposable polystyrene or quartz cuvettes with volumes as low as 12µL

## 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 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.

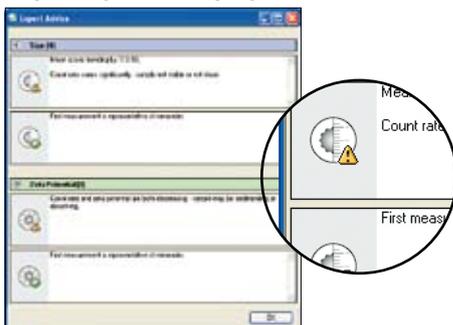
A high degree of automation in the measurement process ensures simplicity of operation and avoids inappropriate settings.

### Sample measurement view



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

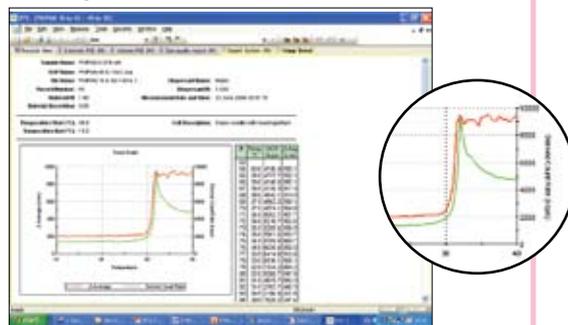
### Expert System display



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

- 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

### Trend plot



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

## Overview

## Zetasizer nano ZS

Size, zeta potential and molecular weight measurement of particles, emulsions and molecules

### Size measurement

<i>Size range</i>	0.6nm - 6 microns*
<i>Minimum sample volume</i>	12µL
<i>Concentration range</i>	0.1mg/mL Lysozyme to 40%w/v*
<i>Measurement angle</i>	173°

### Zeta potential measurement

<i>Minimum sample volume</i>	0.75mL
<i>Maximum sample conductivity</i>	200mS/cm

### MWt measurement

<i>Molecular weight range</i>	1 x 10 <sup>3</sup> to 2 x 10 <sup>7</sup> Da*
<i>Minimum sample volume</i>	12µL
<i>Minimum sample volume for automated measurement using titrator</i>	3mL

### Automated trend measurement

<i>Standard software</i>	Time and Temperature
<i>Using optional MPT-2 autotitrator</i>	pH, conductivity or additive

### Flow measurement (Flow cell required)

Maximum flow rate – 1mL/min  
Optional upgrade to input signals from two external detectors

### General specifications

<i>Temperature range</i>	0°C to 90°C
<i>Condensation control</i>	Purge facility using dry air
<i>Laser</i>	4mW He-Ne, 633nm
<i>Product laser class</i>	Class 1 compliant, EN 60825-1:2001 and CDRH
<i>Size</i>	320mm, 600mm, 260mm (W,D,H)
<i>Weight</i>	19kg

### Options

50mW 532nm laser  
High temperature option 0°C to 120°C  
Narrow band optical filter, 633nm or 532nm  
MPT-2 Autotitrator  
Autodegasser for MPT-2  
SV-10 Viscometer for measurement from 0.3mPa.s and 10,000mPa.s  
Advanced data processing software  
21 CFR part 11 operating mode software  
\* Sample dependent

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**Zetasizer**

**nano ZS**

## Advanced technology made easy

distributor details

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detailed specifications at [www.malvern.com/zetasizernano](http://www.malvern.com/zetasizernano)

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