

Particle size 

Zeta potential 

Molecular weight 

Zetasizer

nano ZS90

ZS90

The **ultimate** in desktop particle characterization

### A routine analysis system for particle characterization

The Zetasizer Nano ZS90 brings you the practicality of a maintenance-free system with the versatility to offer precision measurement for your laboratory's particle characterization needs in a single compact unit.

#### Particle Size

The ZS90 uses the technique of dynamic light scattering to measure the size of a wide range of materials in the size range of 0.6nm to 3 microns.

The measurement technique is absolute, no calibration is required and the measurement itself is simple.

The results are accurate and repeatable.

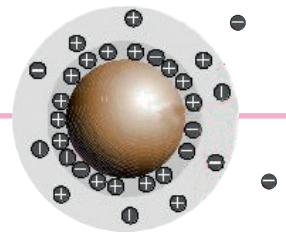
- **Pharmaceutical dispersions and emulsions**
- **Nanoparticles**
- **Chemicals – surfactant micelles**
- **Colloid size and size distribution**
- **Liposomes / vesicles**



Zeta potential of particles and surfaces

The Zetasizer Nano ZS90 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 analysed and their mobility distributions calculated.

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



#### Quality control and Research

Standard Operating Procedures (SOP) ensure that measurements are simplified and results are repeatable between operators and sites. Compatibility with ISO13321/22412 and optional 21 CFR part 11 compliant software ensures all current recommendations and regulations are met.

An optional research software package gives access to further control of the system and analysis algorithms. A research grade correlator and sensitive Avalanche Photodiode Detector (APD) are standard.

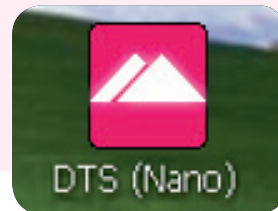
### How easy?

- Uses standard and low volume cuvettes for size
- 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 ZS90 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

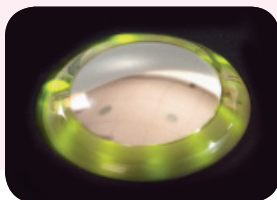
The low volume, folded capillary cell is the first ever for zeta potential which does not require cleaning. To eliminate cross-contamination; fill it, measure and, instead of cleaning, use a new one.

# 2

# 3

#### Load the cuvette

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



#### Run the measurement

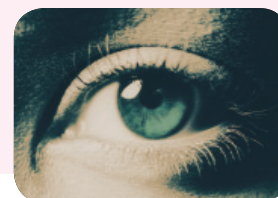
From the menu, select the standard operating procedure (SOP) you need or set your own conditions and click the 'start' button.

# 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

*The ability to measure zeta potential at high concentrations and the zeta potential of material surfaces*

*Simple operation*

*Comparability with results from existing systems with 90 degree optics*

*Elimination of sample cross contamination and no need to clean cell or electrodes*

*Ability to measure zeta potential in high salt systems and non-aqueous media*

*Best quality data*

*Flexibility of data manipulation*

*Help with data interpretation*

*Compliance with regulatory standards*

### We give you

New accessories to extend the sample concentration range and a simple to use accessory to measure surface zeta potential

Standard Operating Procedures (SOP) which ensures that measurements can be repeated using exactly the same parameters to give confidence in the result

90 degree scattering optics to ensure the result from polydisperse samples give comparable results with existing systems

A unique maintenance-free folded capillary cell. The world's first disposable zeta potential capillary cell

Patented M3-PALS (phase analysis light scattering) technology gives operators improved resolution as well as automating the process of measurement

The best laser for DLS measurements and a research grade correlator fitted as standard to maximise the quality of the data collected

Software which incorporates a wide range of features as standard to display and recalculate results. An optional research software package to give additional data processing options, graphs, tables and reports for the light scattering scientist

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 the data quality

Compatibility with the requirements of 21 CFR Part 11 and the ISO13321/22412 standard for dynamic light scattering measurements

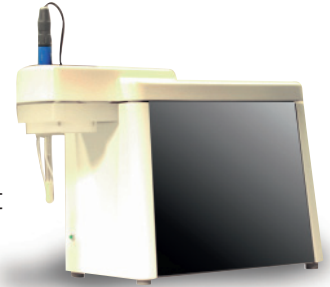
## Accessories and cell options

### 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 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

### 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

#### 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

##### Surface zeta potential cell

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 ZS90 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.

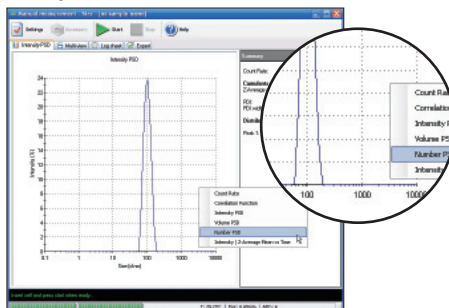
The software is packed with features to aid the new and experienced user alike to get the most out of the system and give confidence in the data.

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.

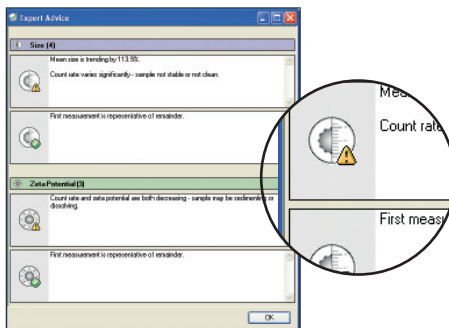
A high degree of automation in the measurement process ensures simplicity of operation and avoids inappropriate settings.

### Sample measurement view



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

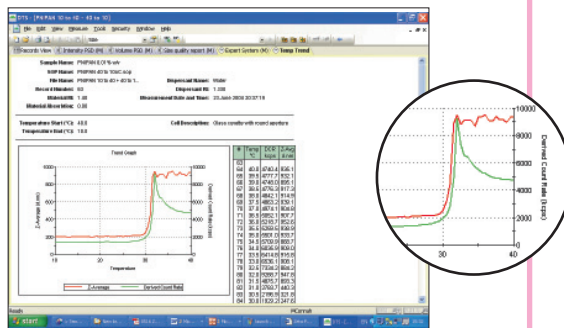
### Expert System display



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

## Specifications

## Zetasizer Nano ZS90

	Parameters measured	Materials
	Hydrodynamic size, zeta potential and molecular weight	Particle dispersions, emulsions, molecular solutions and flat surfaces
<b>Size</b>	Size range maximum (diameter)	0.3nm - 5 microns*
	Minimum sample volume	20µL
	Measurement angles	12.8° and 90° (water as dispersant)
<b>Zeta potential</b>	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
	Minimum sample volume	150µL (<50µL using diffusion barrier technique)
	Maximum sample conductivity	200mS/cm
	Signal processing	M3-PALS
<b>Molecular weight</b>	Molecular weight range (estimated from hydrodynamic diameter)	342Da to 2 x 10 <sup>7</sup> Da <sup>†</sup>
	Molecular weight range (calculated using Debye plot)	9,800Da to 2 x 10 <sup>7</sup> Da <sup>†</sup>
	Minimum sample volume	20µL
<b>General</b>	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
<b>Accessories</b>	MPT-2 Autotitrator	pH, conductivity or additive titration
	Dip cell	Reusable zeta potential measurement cell
	High concentration zeta potential cell	Max. 40%w/v <sup>†</sup>
	Surface zeta potential cell	Sample size 5mm x 4mm x 1mm thick (maximum thickness)
	SV-10 viscometer, viscosity range	0.3 - 10,000mPa.s
<b>Options</b>	Auto-degasser for MPT-2	3 channel
	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
<b>Patents granted</b>	Research software option	Advanced system utilities
	High and Low frequency electrophoresis - Mixed mode measurement (M3)	UK 2361772, EP1154266, US 09/843339, JP 2001-134510
<b>System compliance</b>	CE certification	Product laser class 1, EN 60825-1:2001 and CDRH
<b>System</b>	Dimensions, weight, power	320mm, 600mm, 260mm (W,D,H), 21kg, 100W
<b>Notes</b>	* Peak mode range (diameter), 0.6nm - 3 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	

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# Zetasizer

**nano ZS90**

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