

Zetasizer Nano quick Operation Guide

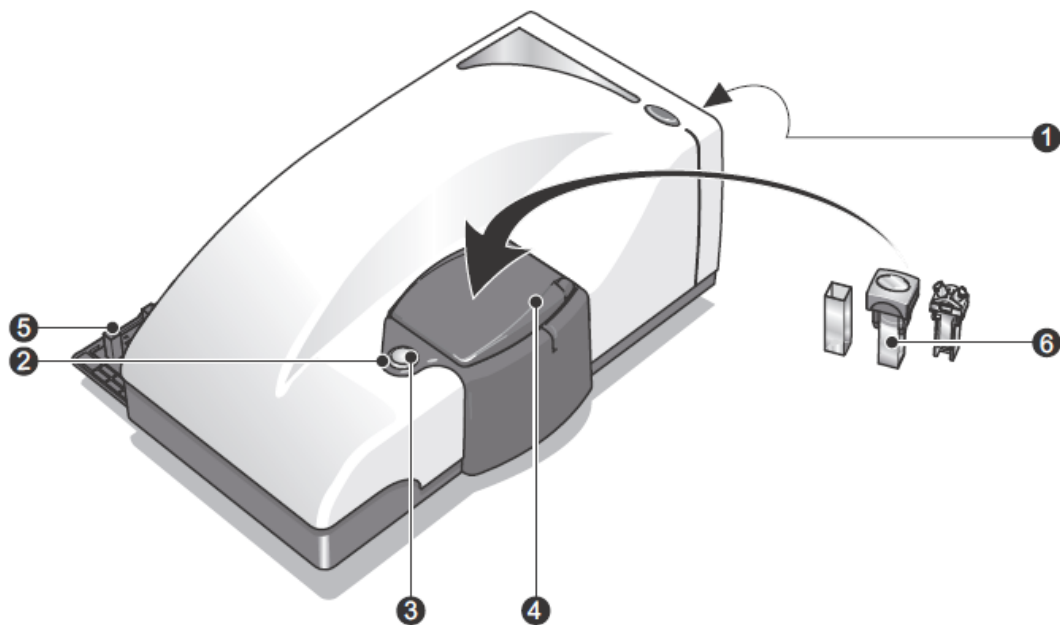
Zetasizer Nano provides the ability to measure three characteristics of particles or molecules in a liquid medium: **particle size**, **zeta potential** and **molecular weight**. Unique technology within the Zetasizer system allows these parameters to be measured over a wide range of concentrations. This manual details **Particle Size** measuring by **Dynamic Light Scattering (DLS)** technique.

Preparing the sample for Size measurement

Zetasizer Nano measures particle Size within **0.3 nm to 10 µm** particle diameter range. Consideration must be given to particle size and sample concentration. If the sample concentration is too low, there may not be enough light scattered to make a measurement. If the sample is too concentrated, multiple light scattering might occur. The table below can be used as an approximate guide to determine the maximum and minimum concentrations for different sizes of particles. As a general rule, measure at the highest concentration possible before multiple scattering and particle interactions affect the result.

Particle size	Min. Concentration (Recommended)	Max. Concentration (Recommended)
< 10nm	0.5mg/ml	Only limited by the sample material interaction, aggregation, gelation, etc
10nm to 100nm	0.1mg/ml	5% mass (assuming a density of 1g/cm ³)
100nm to 1µm	0.01mg/ml (10 ⁻³ % mass)	1% mass (assuming a density of 1g/cm ³)
> 1µm	0.1mg/ml (10 ⁻² % mass)	1% mass (assuming a density of 1g/cm ³)

Optical unit components



ill 8804

The optical unit comprises the following:

- | | |
|----------------------|----------------------|
| ① Rear Panel | ④ Cell area |
| ② Status indicator | ⑤ Cuvette holder |
| ③ Cell access button | ⑥ Cells and Cuvettes |

Making a manual Size measurement

Important: First, **Turn on** the instrument and only then **Start Zetasizer software**. When the measure is finished, first **Exit the software** and only then **Turn off** the instrument.

Do not open an internet browser while Zetasizer software is activated. It can interfere with data acquisition.

- To **power up** the system, Close the lid and turn the power switch at the rear of the unit on. A “beep” will occur to indicate the instrument has been turned on and the initialization routine will begin.

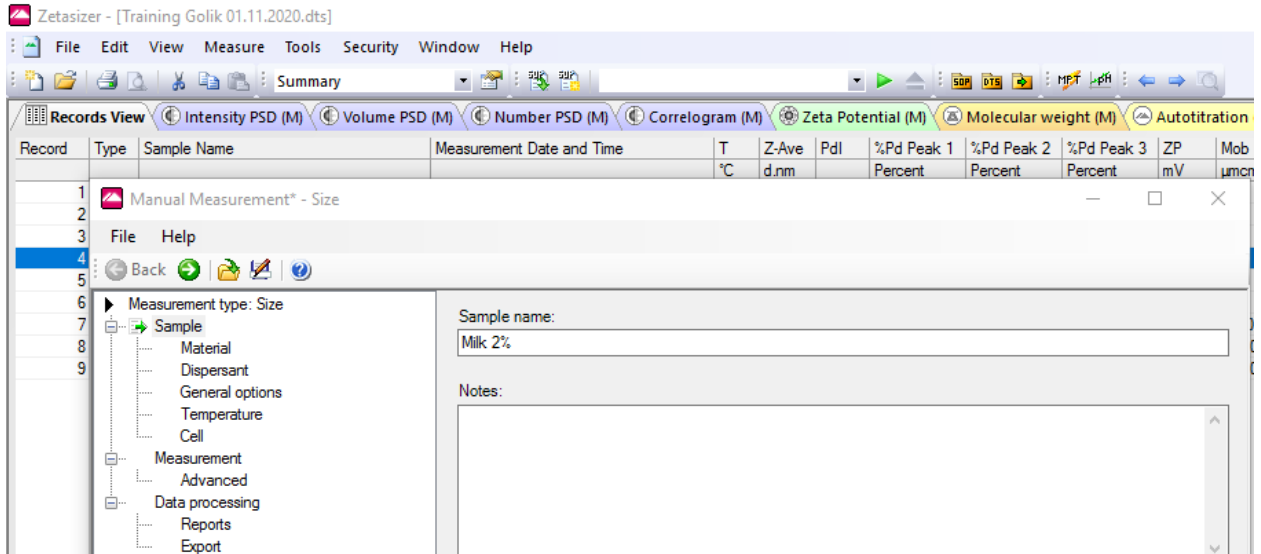


Zetasizer

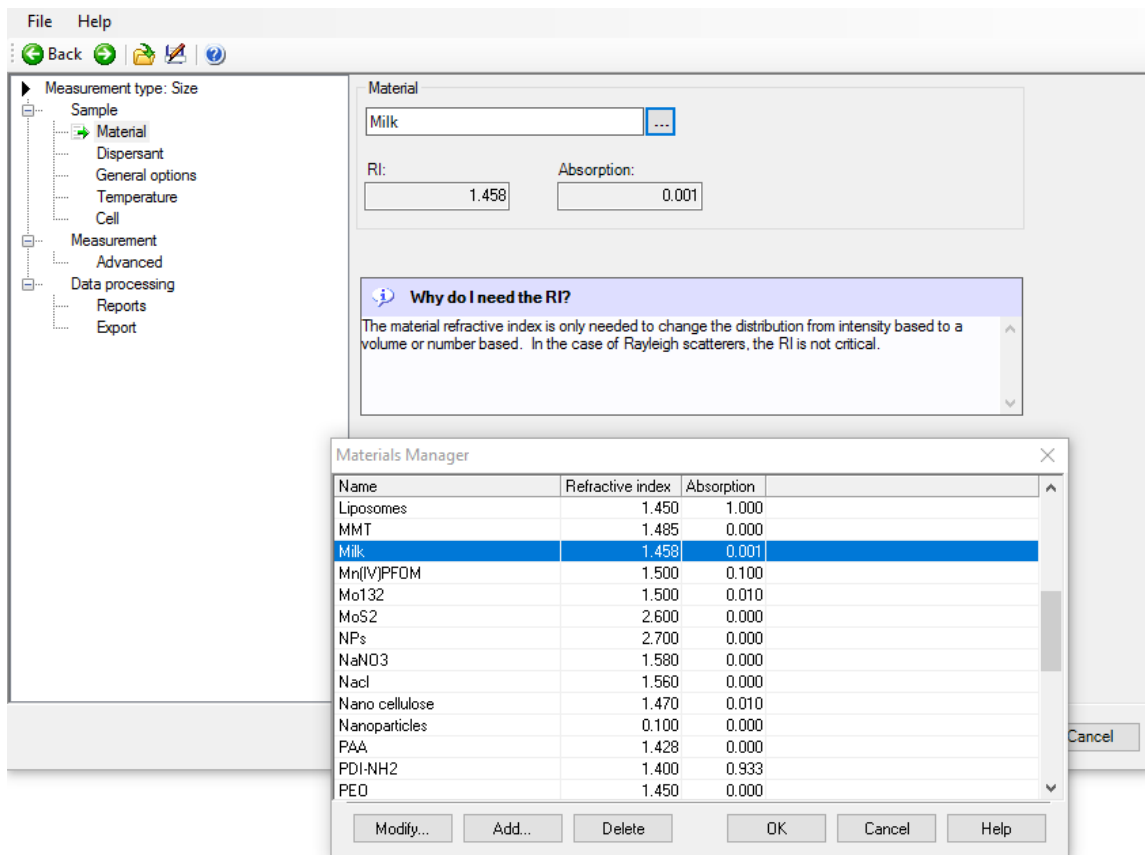
- Double click on the icon **Zetasizer** to **start the software**. Status indicator turns yellowish-green once the instrument has finished the routine.
- Wait **30 minutes** for the laser **to stabilize**.
- Push the cell access button to **open the lid**.
- Fill the appropriate cuvette with the prepared sample so that the liquid **meniscus** is **between the marks** indicated on the inner side of the lid. Tap gently to remove air bubbles.





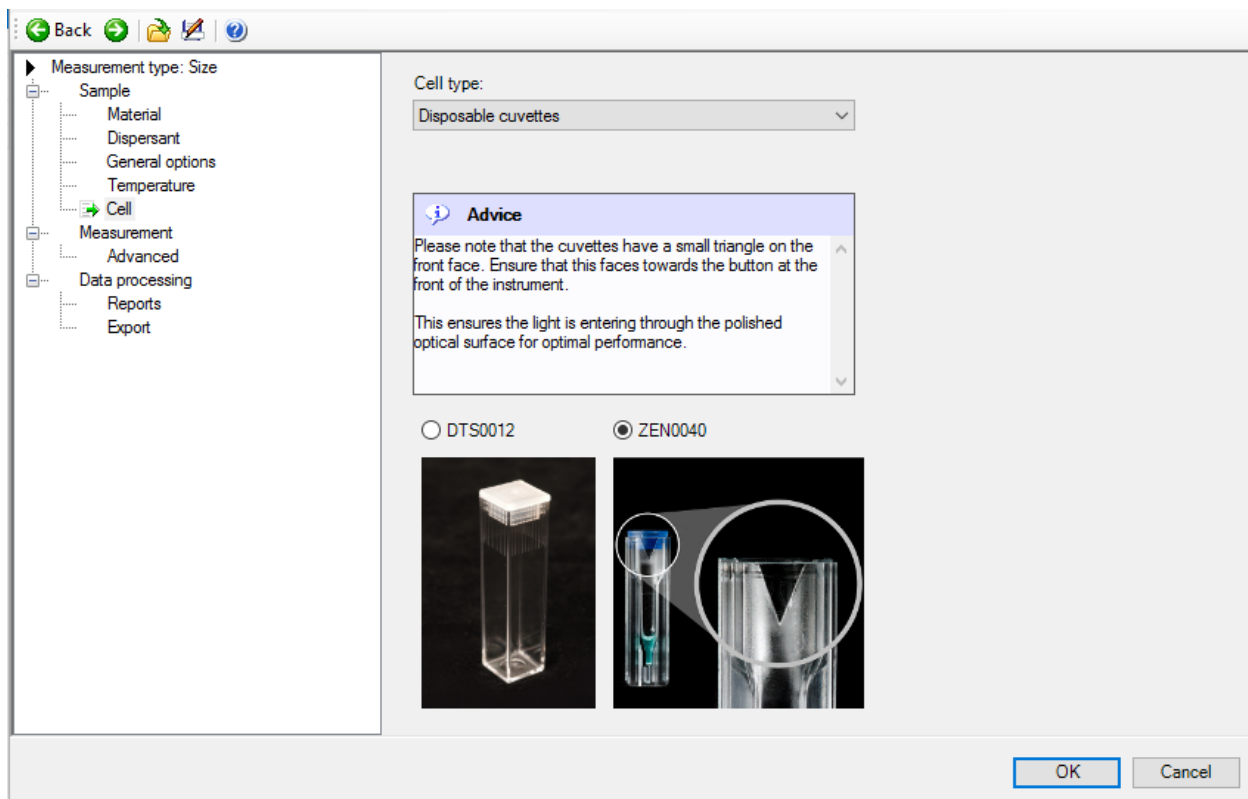
- Select from Menu **Measure > Manual**. This will open the **Manual measurement** editor.
- Chose **Measurement type > Size**. Follow any onscreen instructions that are displayed. Insert **Sample name** and fill step-by-step all information required as follows:



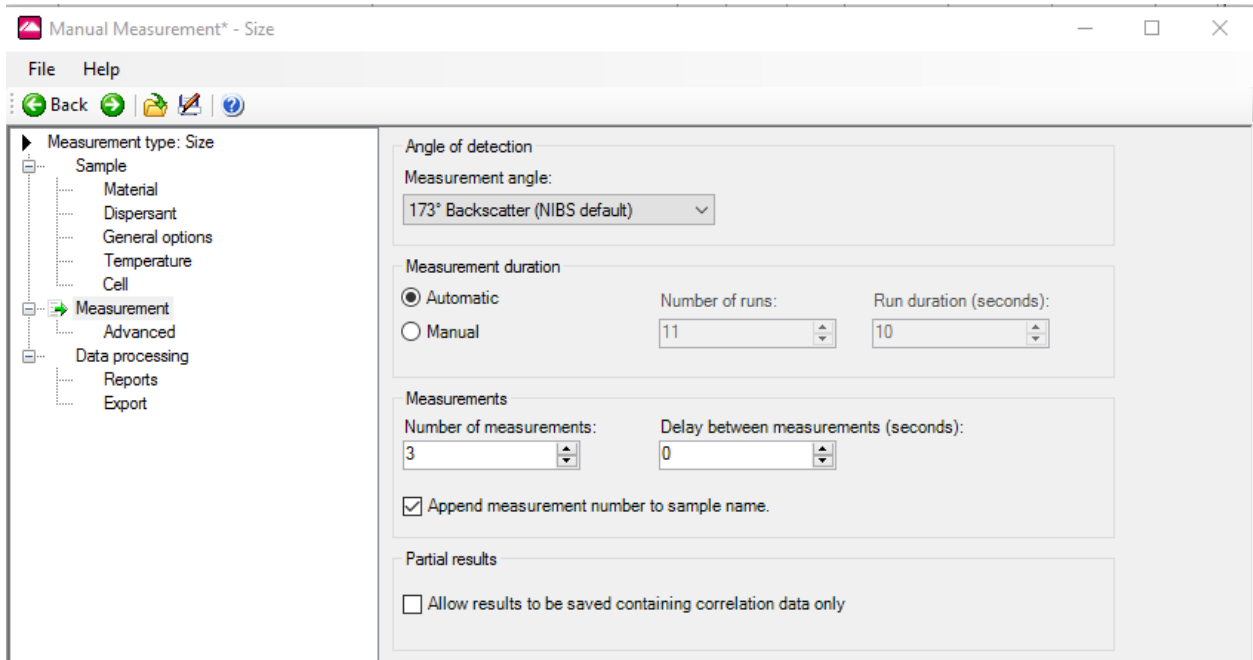
- **Sample > Material.** Press ... button to display the **Material properties manager**. An available material can be selected from the list or, alternatively a material can be added, modified or deleted from the list. The **Refractive index** and **Absorption** can be obtained from a number of sources.



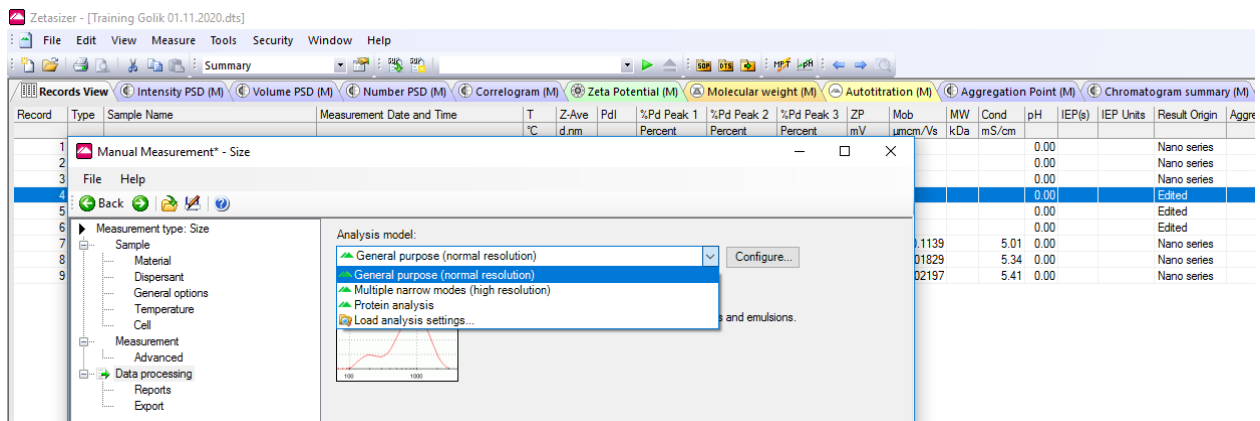
- **Sample > Dispersant.** Press  button to display the **Dispersant properties manager**. Select from the list of the predefined dispersants or add a new one. **Note** that the viscosity is temperature dependent. The Malvern defined dispersants indicated by  logo include a built in viscosity calculation that determines the correct viscosity of the dispersant at any sample temperature.
- **Sample > General options.** Use default values.
- **Sample > Temperature.** Specify the **Temperature** of measurement. The Zetasizer is capable of heating or cooling the sample to allow the measurement to be made at a specific temperature. The measurement will not start until the sample has reached the temperature specified. **Equilibration time** adds a delay before the start of each measurement to ensure the sample temperature is equal to the cell area temperature. Set ~ 2 minutes when temperature close to room temperature is specified.
- **Sample > Cell.** Select the appropriate **Cell type** from the drop down list, then from the displayed cell choices, select the specific cell that will be used for the measurement. **Important:** the **Triangle on the cell top** must face the user, when the cell is inserted into the instrument.



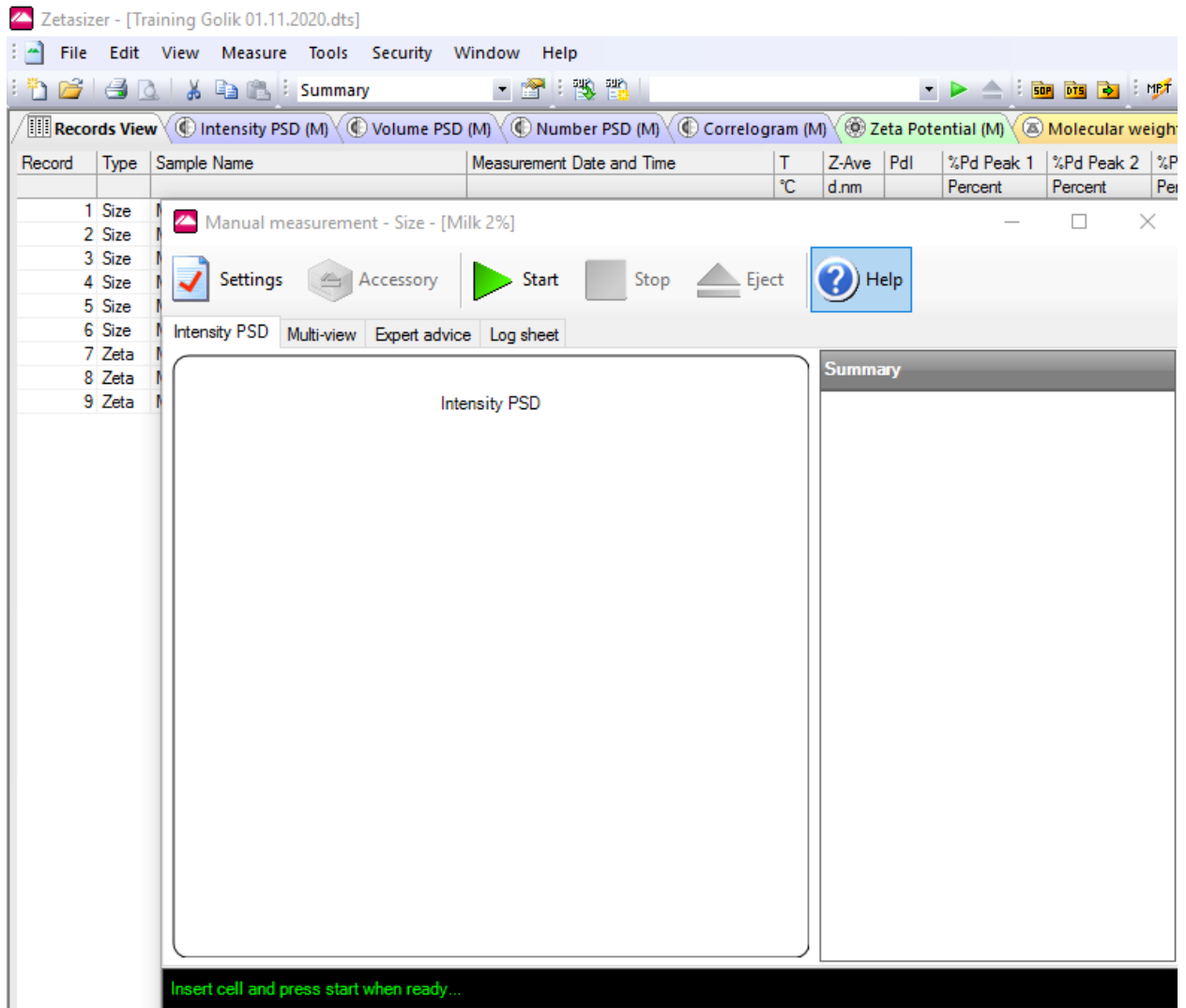
- Measurement.** This window allows the **Duration of the measurement** to be defined, and to make **Multiple measurements** of the same sample. Add a **Delay between measurements** if high/low temperature is used and an equilibration is needed.




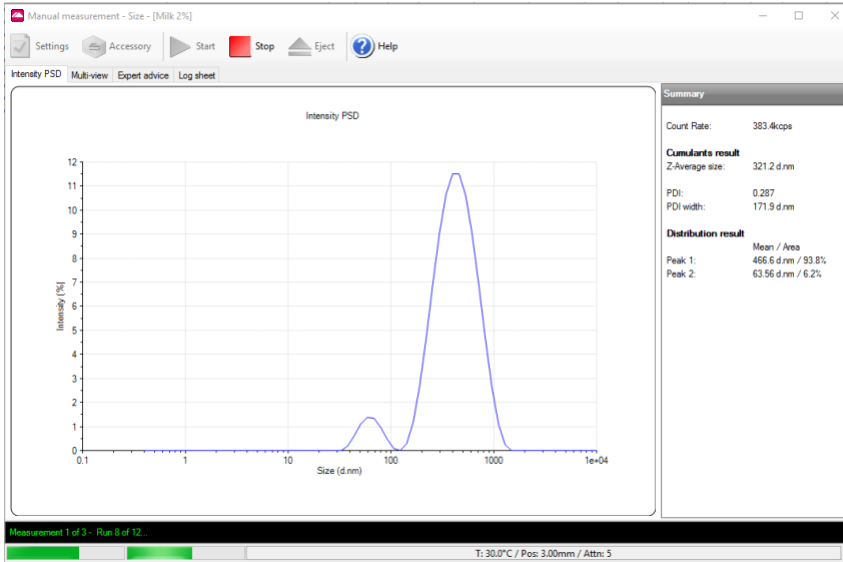
- Data processing.** Select from the drop down list **General purpose (normal resolution)** if the characteristics of the sample to be measured are unknown. If it is known that the sample will give a distribution of more than one narrow peaks select **Multiple Narrow Modes** model. In any case, if size distribution measurement acquired by General purpose mode shows the presence of multiple peaks, the distribution result can be deconvoluted later using Multiple Narrow Modes analysis.



- Once all settings have been made, it could be saved for future measurements of the same type. Select **File-Save as...** from the menu to store the settings. Click the OK button to close the editor and return to the measurement display.

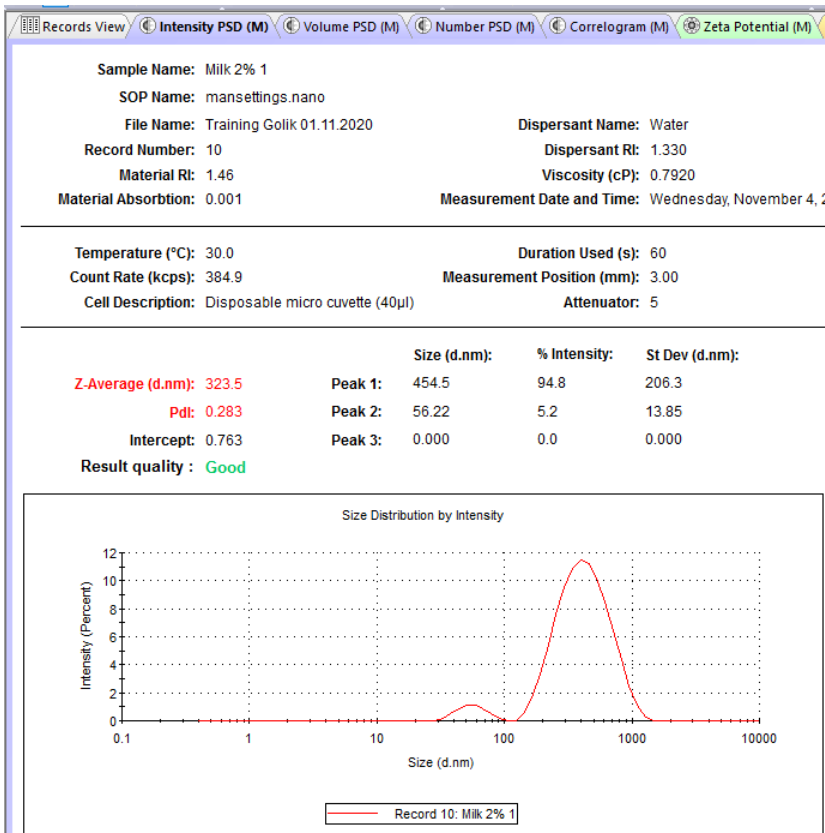


- When requested, **insert the cell** into the instrument until it touches the bottom, close the lid and press the **Start**  button. The measurement will be made and the results displayed
- The **Measurement display** is showing the progress of the measurement.



Size measurements – standard report

- Open the **Record view** tab to display the result as the measurement is taken. Highlight the sample (samples) to view the result in the **Intensity PSD (M)** tab.

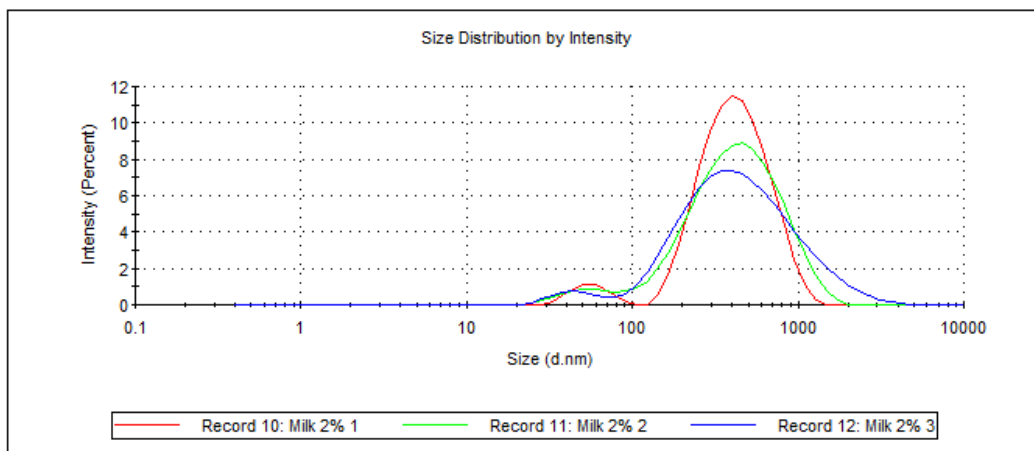


- Up to 3 size populations can be separated and analyzed in the sample. The mean particle diameter **Size**, the relative **Intensity** and the distribution **Standard Deviation** are displayed for each population.
- If more than one sample is highlighted on the **Record view** tab, the **overlay plot** will be displayed as in the **Intensity PDS (Particle Size Distribution)** tab and averaged result will be calculated.

Sample Name: Milk 2% 1	
SOP Name: mansettings.nano	
File Name: Training Golik 01.11.2020	Dispersant Name: Water
Record Number: 10	Dispersant RI: 1.330
Material RI: 1.46	Viscosity (cP): 0.7920
Material Absorbtion: 0.001	Measurement Date and Time: Wednesday, November 4, 2

Temperature (°C): 30.0	Duration Used (s): 60
Count Rate (kcps): 384.9	Measurement Position (mm): 3.00
Cell Description: Disposable micro cuvette (40µl)	Attenuator: 5

	Size (d.nm):	% Intensity:	St Dev (d.nm):
Z-Average (d.nm): 323.5	Peak 1: 454.5	94.8	206.3
Pdl: 0.283	Peak 2: 56.22	5.2	13.85
Intercept: 0.763	Peak 3: 0.000	0.0	0.000
Result quality: Good			



- If **Result quality** is not **Good**, refer to the **Expert Advice** Tab.
- Expert Advice** report provides the information on how good the quality of the measurements is and whether they display any unwanted attributes, such as aggregation, etc..

Saving report and End of instrument operation

- Create a result folder under your own name on the PC\D: disc. Select **File-Save as** in the Intensity PDS window and Save the report.
- **Important: NEVER** use disk-on-key to save the report. Send the report by email. After data acquisition is completed, an internet browser can be opened.
- When the measurement is completed **Pull out** the **cuvette**, **Close** the **lid**. First, **Exit** the **software** and only then **Power off** the instrument.
- Press **Ctrl-Alt-Delete** and **Switch user** or **Turn** the computer **off**.
- Close all software and **SIGN OUT**.