Technical Note - Scanning NTA ZetaView®

# Limitation of sample volume: How to recover a sample after NTA measurement


## Abstract

Full recovery of samples measured by a nanoparticle tracking analyzer (NTA) often becomes challenging particularly if the samples are intended for further use after measurement. Furthermore, depending on isolation techniques and purification methods, especially for biological nanoparticles, the yield of samples is often very low in terms of volume and concentration. Here, we describe a convenient way to fully recover samples in order to re-use them entirely for other purposes after they have been measured in the Particle Metrix ZetaView® instrument when equipped with an NTA- cell assembly.


## Introduction

The Particle Metrix ZetaView® is widely used in life science research for measuring size, concentration, fluorescence and zeta potential of biological nanoparticles, such as extracellular vesicles, proteins, viruses, prions and other cell-derived nanoparticles (1, 2, 3). Despite well-developed extraction techniques and sophisticated isolation methods, the resulting yield of purified nanoparticles is often very low, particularly if isolated only on the laboratory scale.

For that reason, it is important to sacrifice as small a sample volume as possible for measurements -or even better, to recover the sample once it has been measured.

Using the Particle Metrix ZetaView® in combination with the NTA- cell assembly (not possible with the Z-NTA cell assembly) you can easily recover valuable samples after they have been measured.

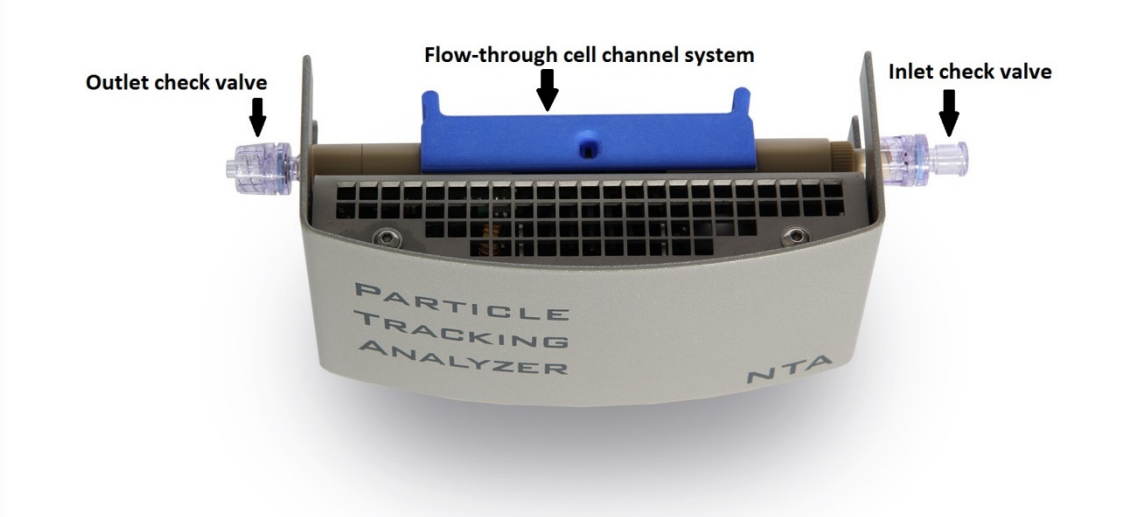


**Figure 1:** NTA-cell assembly showing the inlet and outlet ports as well as the flow-through cell channel. The sample is injected into the right inlet, passes the cell channel and leaves the cell assembly on the left outlet.

Since the NTA- and X-NTA cell assemblies feature a flow-through cell channel system with the inlet and outlet ports located on opposite sides to each other (see Figure 1), you can easily inject your sample on the right side and re-collect it on the left side requiring a minimum of 600µl sample volume.

## Methods

### Recovering the sample by re-collecting it in a tube

After the sample has been measured, it can easily be collected on the left outlet of the cell assembly in an Eppendorf tube or similar vial. Figure 2 shows the complete set-up.


**Figure 2:** ZetaView set-up with corresponding NTA-cell assembly. The sample is injected via a syringe on the right and collected on the left using an Eppendorf tube.

After measurement, the sample is not lost and can be re-collected in an appropriate reaction tube. With this set-up, the sample flow is unidirectional from right to left because the check valves do not allow re-collecting the sample back by drawing it into the syringe.

### Recovering the sample by drawing it back into the syringe or re-collecting it in a tube

To have the flexibility to draw the sample back into the syringe after having done the measurement, the check valves (see Figure 1) must be unscrewed in order to allow the sample to go bi-directionally through the flow cell. This set-up is shown below in Figure 3.


**Figure 3:** ZetaView set-up as showed in Figure 2 but with the check valves removed. The sample can be injected by a syringe and re-collected in a reaction tube or by drawing it back out of the measurement cell into the syringe after the measurement.

With the check valves unscrewed from the inlet and outlet ports of the cell assembly, the sample can either be re-collected into a tube at the left side or sucked back into the original syringe at the right side without using the left outlet port. This way of re-collecting the sample is possible if the sample volume that is injected into the instrument does not exceed 1000µl. A larger volume would exceed the capacity of the cell, meaning sample begins to flow out of the left outlet port.

## Conclusion

Re-collecting the entire sample either in a tube or by drawing the sample back into the syringe is of great benefit for researchers struggling with high limited sample volume or very low particle concentrations that needs to be used for further experiments. Therefore, sacrificing as little sample as possible, especially if the particle concentration is so low that the sample needs to be measured undiluted, is a great advantage.

## References


1. Shu Liu et al. (2017)
   Prions on the run: How extracellular vesicles serve as delivery vehicles for self-templating protein aggregates
   Prion., Mar 4;11(2):98-112. doi: 10.1080/19336896.2017.1306162.

2. Kordelas, L. et al. (2014)
   MSC-derived exosomes: a novel tool to treat therapy-refractory graft-versus-host disease. Leukemia, 28, 970- 973 doi:10.1038/leu.2014.41

3. NOURI, M. et al. (2012)
   Effect of Partially Hydrolyzed Kappa-Casein on Physicochemical and Sensory Properties of Heated Milk
   Journal of Dispersion Science and Technology, 33. Jg., Nr. 8, S. 1204-1209.