



# A Quick-start Guide for DelsaMax PRO Dip Cell

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## Introduction

The DelsaMax PRO Dip cell can be used to measure the electrophoretic mobility of nanoparticles and macromolecules. Hydrodynamic radius may be determined simultaneously. The DelsaMax PRO utilizes phase analysis light scattering (PALS) for mobility measurement and dynamic light scattering (DLS), also known as quasi-elastic light scattering (QELS), for size measurement. The DelsaMax PRO Dip cell provides these benefits:

- Low sample volume. In many cases, samples can be reclaimed.
- Easy to load sample.
- Easy to clean.
- Useful for quick “pilot” measurements before automated study of multiple sample conditions.

## Specifications

Recommended sample volume	65 $\mu$ L
Conductivity range	0 – 7 mS/cm
Compatible solvents/buffers	Aqueous and certain non-volatile organic solvents <sup>1</sup>
Mobility sensitivity	5 mg/mL bovine serum albumin <sup>2</sup> ( $M_w=67$ kDa)
Electrode gap dimension	2.0 mm
Electrode material	Platinum
Wetted materials	Platinum, PEEK, epoxy
QELS/DLS radius range	0.3 nm – 200 nm
PALS radius range	2 nm - 50 $\mu$ m

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<sup>1</sup> Please contact Beckman Coulter Customer Service for organic solvent compatibility.

<sup>2</sup> In phosphate-buffered saline containing 5 mM sodium phosphate, 5mM sodium chloride and 20ppm sodium azide, pH 6.9.



## Software and Firmware Support

### Firmware Version

Make sure firmware version **1.0.2.6** or later is installed in the DelsaMax PRO to support Dip cell measurements.

See Figure 1 for location of firmware information on the LCD front panel of the instrument.

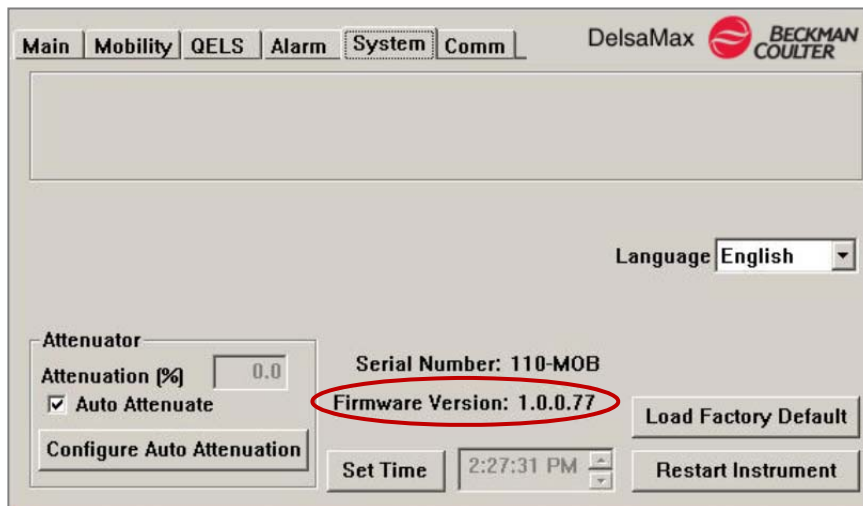


Figure 1

### **Note:**

When upgrading from a previous version of the firmware, make sure to uncheck the “Active Low” checkbox next to “Alarm IN” on the Alarm tab on the DelsaMax PRO front panel. The instrument will beep after the new firmware has been installed until this checkbox is unchecked.

See Figure 2 for details

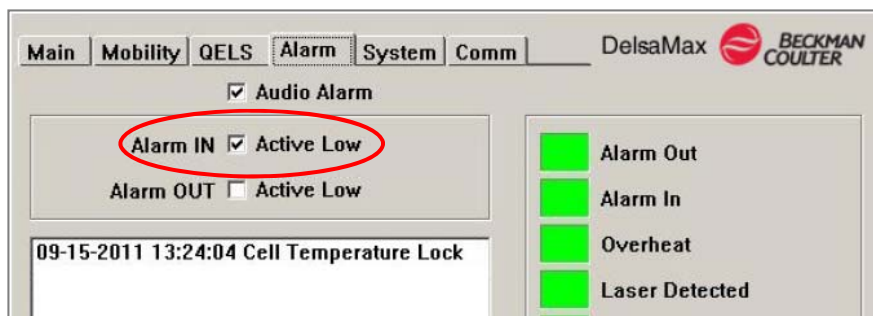


Figure 2

## Software Version

Make sure DelsaMax software version **1.0.0.26** or later is installed in the DelsaMax PRO to support Dip cell measurements.

To check DelsaMax software version, select the menu item Help->About DelsaMax...

See **Error! Reference source not found.** Figure 3 for details.

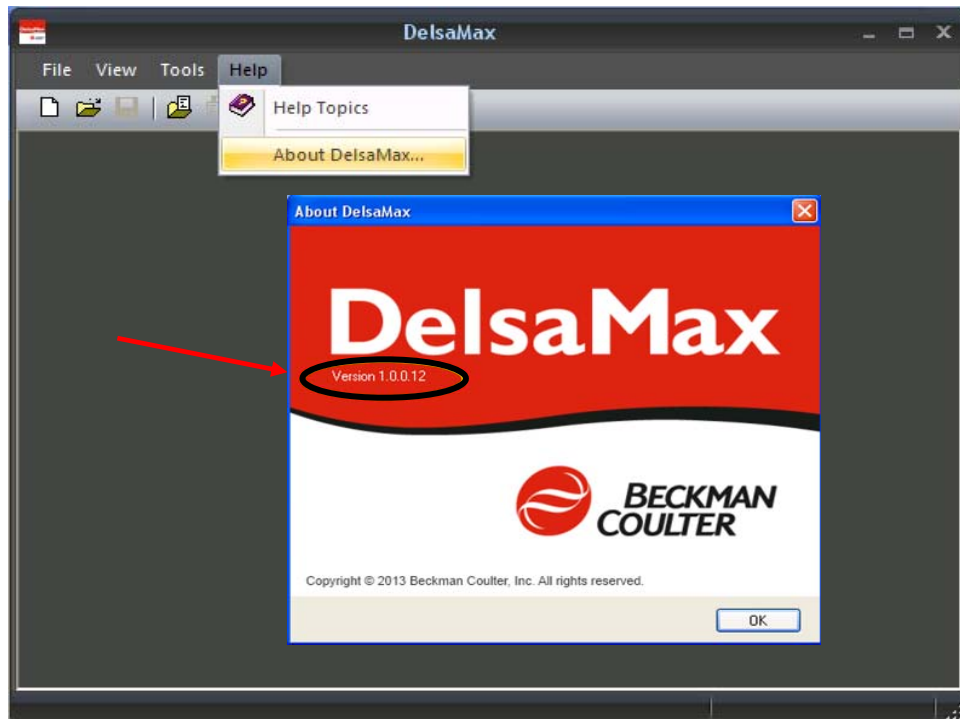


Figure 3

## Initialization of Dip Cell Parameters

Before the Dip cell can be used for the first time, the parameters of the Dip cell **must** be loaded. **This initialization process needs implementing only once.**

The file containing the parameters is available on the USB drive that is included in the Dip cell kit. Navigate to the file “DipCellParameter” and right click to open the file with **DelsaMax software** as in Figure 4

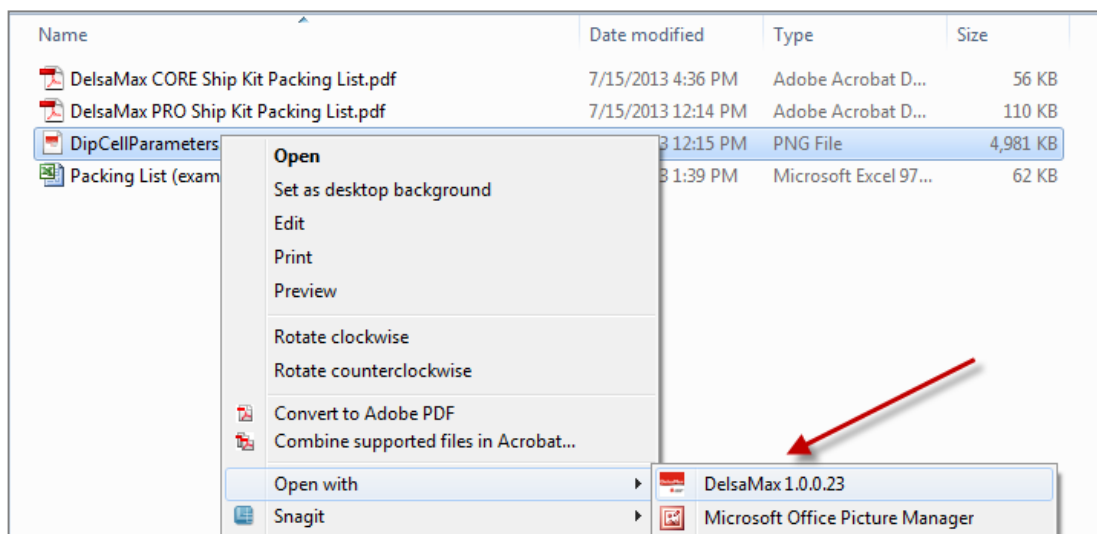


Figure 4

Once the parameters file is opened in DelsaMax software, click on **“Instrument Profile”** and select your instrument by serial number then click on the icon **“Connect to Instrument” (Ctrl+H)**.

Once the connection is established, the start button will turn green. Click the start button once to initialize the Dip cell parameters. Once the start button turns from yellow to green, your Dip cell is initialized and ready to use.

## Loading Sample

The recommended sample volume for the Dip Cell is 65 $\mu$ L.

The quartz cuvette should be clean and free of dust on the inside and outside before loading the sample.

To load sample:

1. Place the quartz cuvette in the cell holder.



Figure 5



Figure 6

2. Draw 65  $\mu$ L of the sample into a transfer pipette or a syringe.
3. Place the needle or pipette tip all the way to the bottom of the cuvette and dispense the sample into the cell.
4. If dispensing with needle, care should be taken not to scratch the cuvette window when placing the needle into the cuvette.
5. Carefully insert the Dip electrode assembly into the filled cuvette. Be sure not to introduce air bubbles in between the electrodes.



Figure 7

6. Now the sample is ready for measurement.



Figure 8

### Alternative Method for Sample Loading

The following method minimizes the probability of trapping air bubbles in the solution.

While loading the sample with the pipette tip, first dispense a small amount of sample between the electrodes so that it is held in place by surface tension.



Figure 9

Dispense the rest of the sample into the cuvette as described above and then slowly insert the electrode assembly into the cuvette.

If you see any small bubbles on the electrodes, a gentle tap on a table top should remove it. If not, the sample must be reloaded.

## Validation

To validate the Dip cell, we recommend using the Beckman Coulter mobility standard, A50695. The mobility standard can be ordered from Beckman Coulter for replenishment. The measured conductivity and electrophoretic mobility should meet the following specifications:

	Specification
Conductivity	$1.21 \pm 0.20$ mS/cm
Electrophoretic Mobility	$-4.20 \pm 0.40$ $\mu\text{m}\cdot\text{cm}/\text{V}\cdot\text{s}$

## Routine Cleaning

### Cleaning the Quartz Cuvette

To wash the quartz cuvette, use 1% Liquinox (available from Alconox, catalog# 1232-1) or 1% Tergazyme (available from Alconox, catalog# 1304-1) in a wash bottle. Rinse with Liquinox or Tergazyme. Gently rub the inside of the cuvette with a polyurethane foam swab. Flush with copious amounts of DI water, then ethanol and place upside down to dry. For fast drying, blow-dry with clean, filtered dry air/nitrogen.

For tough stains, the following cleaning solutions are recommended:

- 1% Hellmanex (available from Hellma, catalog# 320.002): for stubborn stains and deposits. Hellmanex should be used at 40°C for 20-30 minutes. Fill the cuvette and place in a water bath or in your Möbiuζ for heating.
- Nitric Acid (10%): Soak for 10 min and then rinse thoroughly with DI water.

### Cleaning the Dip Electrode

When the recommended sample volume is used, only the platinum electrodes are wetted and they can be cleaned easily. Gently rub the platinum electrodes with a polyurethane foam swab soaked with detergent, rinse with water and blow dry with clean, filtered dry air/nitrogen.

To remove tough stains, soak the Dip electrode in 30% hydrogen peroxide overnight.

See Appendix A for complete Dip cell cleaning protocol.

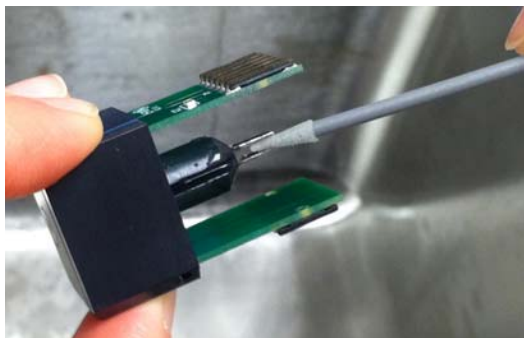


Figure 10

## Storage

If the Dip electrode will not be used for more than 24 hours, it is recommended that both the quartz cuvette and Dip electrode be cleaned and thoroughly blown dry with clean, filtered dry air or nitrogen. The Dip electrode can then be installed into the quartz cuvette for storage. This keeps the Dip cell protected and the quartz cuvette dust-free.



Figure 11



## Appendix A:

### Disassembly and Thorough Cleaning of the Dip Cell

This section describes how to take apart the Dip electrode assembly for more thorough cleaning.

#### Components of the Dip Cell P/N B40096

The diagram below shows the removable parts of the DelsaMax PRO Dip cell. The numbers in the exploded view correspond to the numbers in the first column of the parts list as well as numbers in parentheses in the instructions below.

#### Parts List

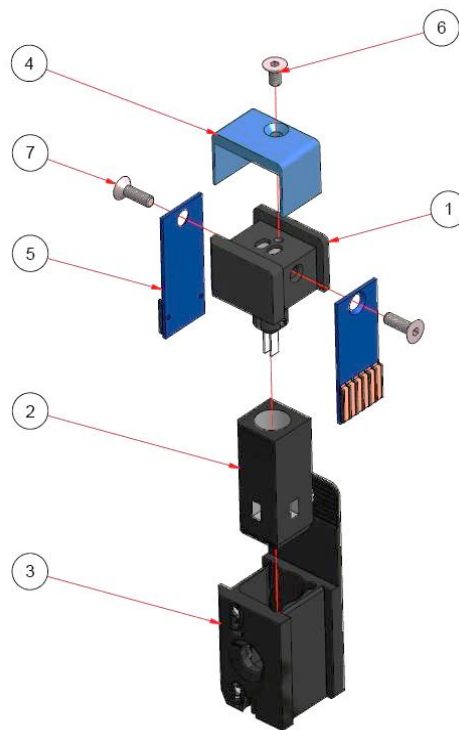


Figure 12

Parts Lists			
Item	Quantity	Part Number	Description
1	1	B43273	Dip Electrode Assembly
2	1	B34562	Quartz Cuvette, 45 $\mu$ L, 3x3x5 mm <sup>3</sup>
3	1	B43271	Dip Cell Holder
4	1	B43270	Dip Cell Cover
5	2	B43269	Dip Cell Circuit Board
6	1	B29664	Flathead Screw, M3x6
7	2	B43281	Flathead Screw, M3x10

## Disassembly

The platinum electrodes are permanently built into the Dip electrode assembly and cannot be disassembled.

1. Prepare a clean surface on which to place components.
2. Remove the Dip electrode assembly from the quartz cuvette.

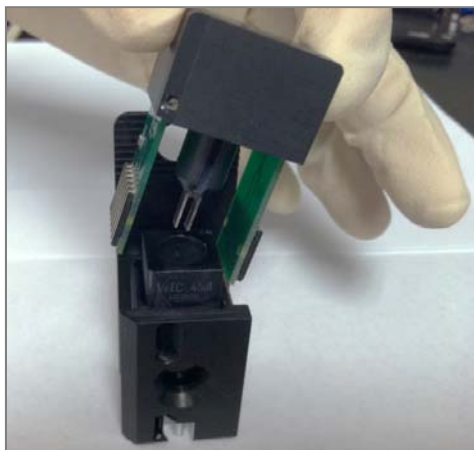


Figure 13

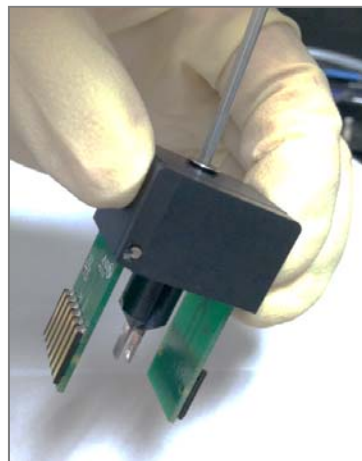


Figure 14

3. Begin the disassembly by loosening and removing the flat head screw (6) that secures the top cover (4).

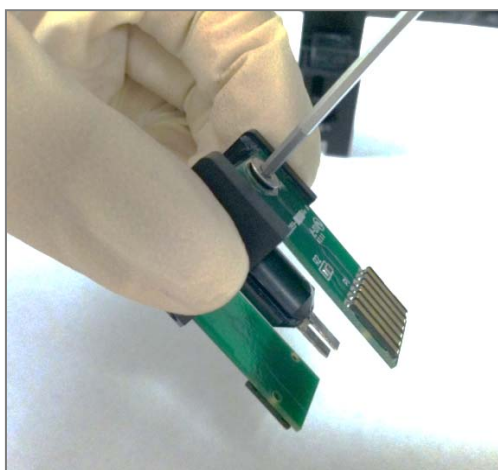


Figure 15

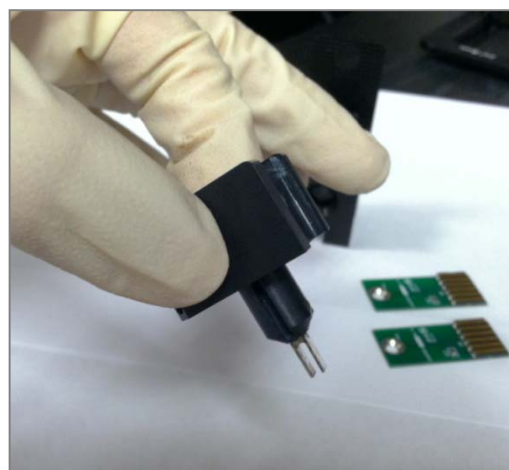


Figure 16

4. Remove the top cover (4) which exposes the flat head screws (7) that retain the circuit boards (5).
5. Carefully loosen and remove the flat head screws (7) that secure the Dip cell circuit boards and put them away for reassembly later.
6. Now the Dip electrodes are ready for thorough cleaning.

## Cleaning

After disassembly, clean the Dip electrode by gently rubbing the platinum electrodes with a foam tip soaked with detergent, rinsing with water and blowing dry with clean, filtered dry air/nitrogen.



Figure 17