

Read this first



Zetasizer

nano series

Quick start & Self installation guide



Zetasizer Nano Quickstart and Self installation guide

MAN0383 Issue 5.0 August 2009

Read this manual first

English

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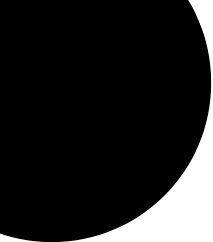
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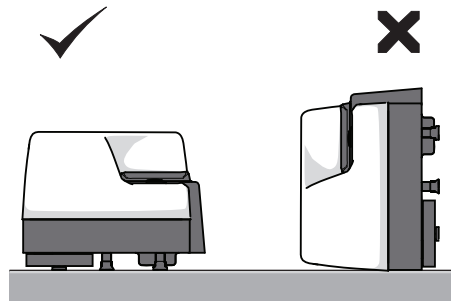
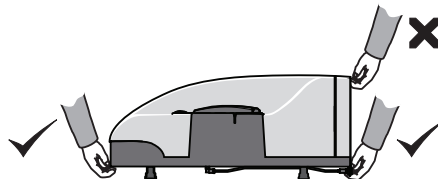
Part 1: Setting up the Zetasizer Nano

Introduction

Work through this section to set the instrument up. The other sections show how to make the initial test measurement, then your own measurements in future.

**Warning!**

Never lift the instrument by its covers. Always stand it on its feet, not its side.



ill 7929

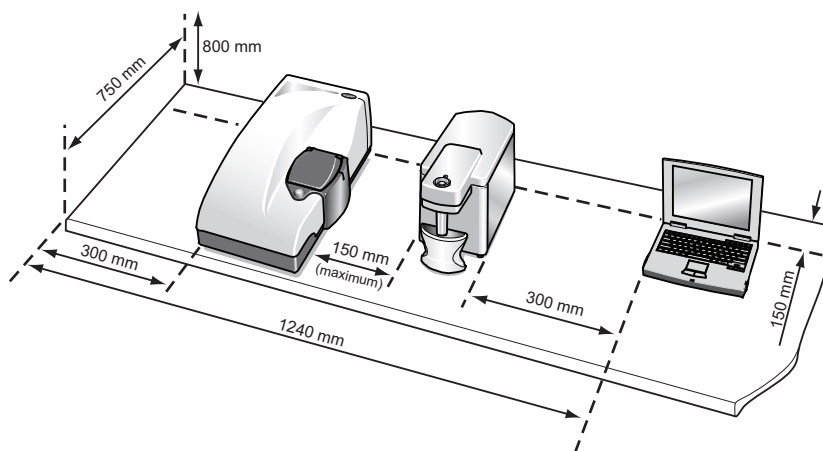
ill 7930

Site requirements

The site must be:

- Indoors and away from strong light (avoid windows).
- Away from heat sources like radiators.
- On a horizontal vibration-free bench.
- Well ventilated (if measuring noxious materials).

Allow space for the instrument as shown below (the **Essentials Manual** gives the full requirements):



ill 7931

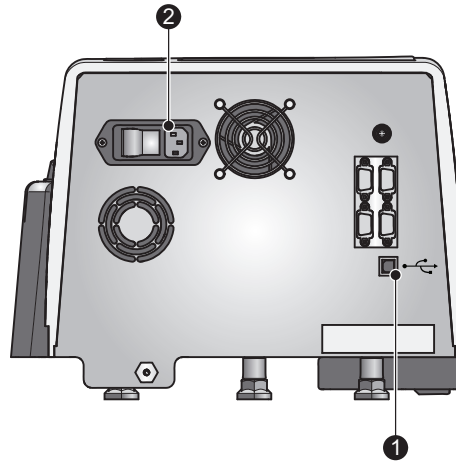
Connecting up the system



Warning!

This instrument must be connected to a protective earth!

- Unpack the cables from the Installation Kit.
- Connect the USB cable to the USB connectors on the instrument ① and the computer.



i117932

- c. Connect the power cable to the power socket ② on the back of the instrument.
- d. Make all computer connections (keyboard, power, etc.), following the maker's instructions.

Installing the software

- a. Insert the **Dispersion Technology Software** CD in the CD drive.
- b. If **Autorun** is enabled on the computer, the software will display an introductory screen. If **Autorun** is not enabled, double-click the file **Setup** on the CD to display this screen.
- c. Click the **Click here to install...** link and follow all on-screen instructions to complete the installation.

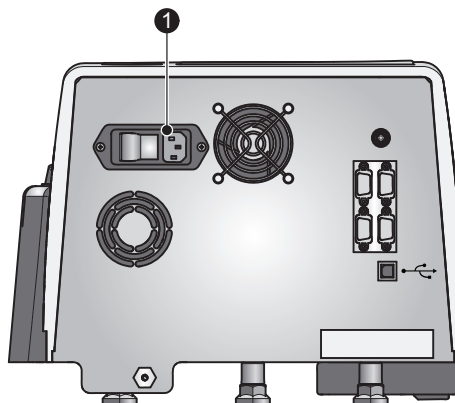
Turning on the instrument and starting the software

- a. Turn on the instrument by pressing the power switch ① on the back of the instrument:



Note

On initial switch on and connection of the instrument to the computer, the message **Found new USB device** or similar will appear. Once the computer has been configured for use with the instrument, this message will no longer appear.



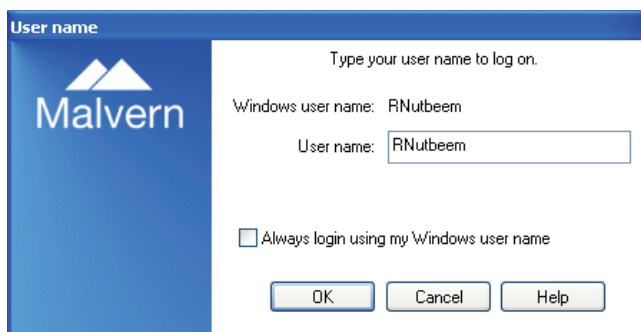
i11 7934

- b. Start the software by double-clicking the icon.



Zetasizer

- c. If this window is displayed, it will show your Windows login name. Click **OK**.

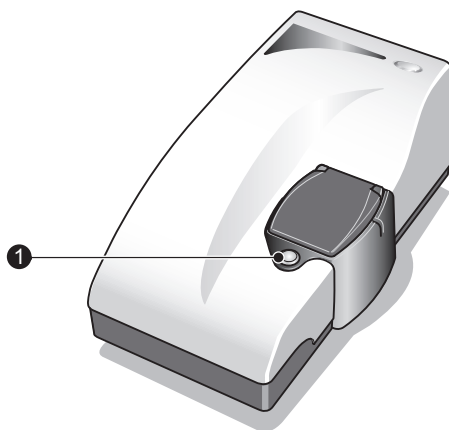


The instrument **must be powered up for 30 minutes before a measurement is made** to ensure its temperature has stabilised

Checking the system

The status light ① turns green if the system has connected successfully. If it is green proceed to Part 2.

If it is not green, use the table below to troubleshoot the problem.



ill 7933

In case of failure

If the light is not green, use this table to try and solve the problem. If the status light still does not turn green after this, contact the local Malvern representative.

Light appearance	Action to take
Light not illuminated	This shows there is no power. Check that: ■ The power lead is connected. ■ The instrument is switched on. If the above suggestions do not help, replace the fuses as shown in the Essentials Manual (this is a task for the supervisor; not operators).
Amber light	If there is no "system not responding" message on the computer screen: ■ Check that the software is running. ■ Check that you have logged on. If there is a "system not responding" message on the computer screen: ■ Check that the lead between computer and instrument is connected. Reconnect it and click OK on the screen; this should make the status light green. ■ Check that the computer USB port is set up correctly; refer to the computer's documentation or online help.
Red light	This indicates an internal error with the system. Contact the local Malvern representative.

Part 2: Running the Installation Test

Introduction

This chapter shows how to make a size and/or zeta potential measurement to test the installation of the Zetasizer Nano. Work through the steps in the order given here.

Power on

If it is not already switched on, turn on the instrument and start the software, as described in the previous chapter. Remember that the instrument **must be powered up for 30 minutes before a measurement is made**.

Unpack the Zeta potential transfer standard

Take the **Zeta potential transfer standard** syringe from the pack this document was in.



Note

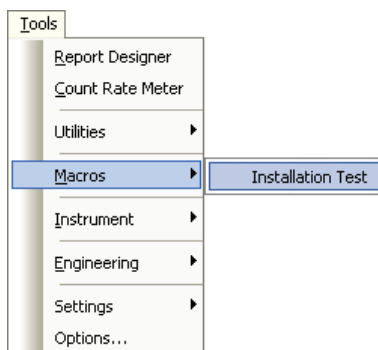
If a CD was supplied with the installation sample syringe, the macro program on the CD needs to be installed before continuing with this procedure (**Note**: check the macro program is correct for the **Zeta potential transfer standard** being measured; consult the 'read me' file on the CD). This is a new installation test macro that is designed to be used with the test sample. The program should auto-install when the CD is inserted into the disk drive. If the installation does not start please refer to the 'read me' file on the CD.

**Note**

This new test macro will only be updated for the user that is currently logged on to the PC. If a different user subsequently logs on, they will need to reinstall this program before it can be used to test the operation of the system.

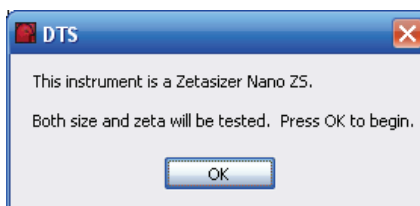
Run the Installation test macro

When the software has been started, select **Tools-Macros-Installation Test**:

**Note**

The results are saved to a measurement file named **Installation Test.dts** which opens automatically.

The instrument reports what it is going to test: size, zeta potential or both. Use this information to decide which cell(s) to prepare.

**Note**

This is the instrument confirming which type it is. In brief, if the instrument name contains an **S** it tests **size** and if it contains a **Z** it tests **zeta potential**. A Zetasizer Nano **ZS** or **ZS90** tests both.

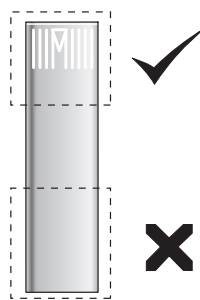
Fill the cuvette and/or cell

Prepare the appropriate cuvette/cell for size and/or zeta potential measurement as described here. For example, if the instrument reported just now that it will test only zeta potential measurement, skip the **Size test** procedure below.



Important

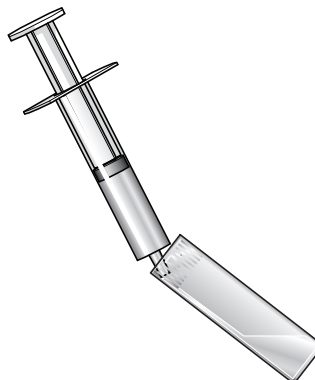
Always hold the cuvette or cell near its top, not the optical area near its base. Fingerprints, grease or dust on the lower area will cause the test to fail.



ill 8486

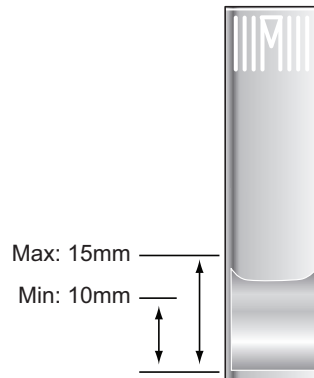
Size test

- Take a square plastic cuvette (not a glass one) from the consumables pack.
- Fill it with between 1.0mL and 1.5mL of the supplied **Zeta potential transfer standard** from the syringe, as follows.
- Tilt the cuvette and allow it to fill slowly. To stop bubbles forming, let the sample flow down the inside.

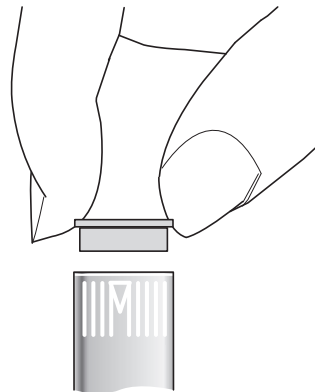


ill 7935

- d. The sample depth should be between 10 and 15 mm. This can be checked by placing the cuvette against the diagram on the inside of the cell area lid.



- e. Push the lid securely onto the cuvette:



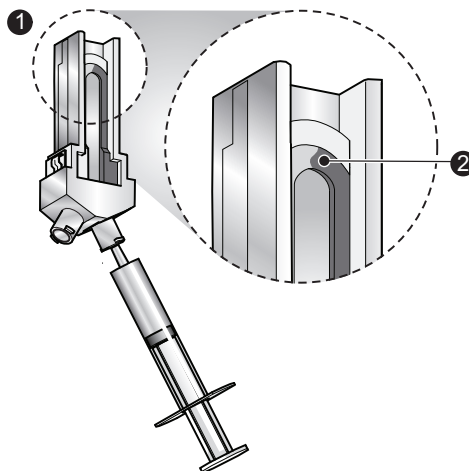
ill 7936

ill 7937

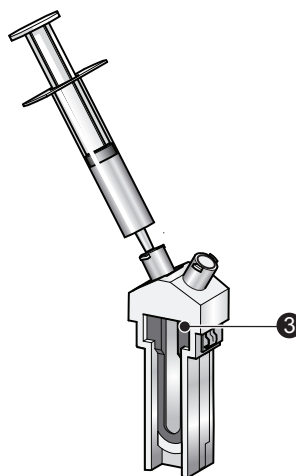
Zeta potential test

- a. Take a supplied **Folded capillary cell** and rinse internally with ethanol or methanol. A syringe or wash bottle can be used. Use sufficient fluid to just wet the inside surface of the cell and the electrodes.
- b. Flush the cell through with deionised water to clean. Flushing a few 10ml syringe full through the cell should suffice.

- c. Invert the cell ①:

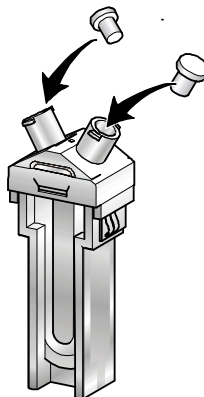


- d. Slowly inject the **Zeta potential transfer standard** from its syringe into the cell, filling the U tube to just over half way ②. ill 7938
- e. Check no air bubbles form in the cell. Tap the cell gently to dislodge any that do form.
- f. Turn the cell upright and continue to inject slowly until the sample is at the top of the electrodes ③.



- g. Check again for bubbles in the cell. Tap the cell gently to dislodge these. ill 8485
- h. Ensure that both electrodes on the inside of the cell are completely immersed in the sample.

- i. Remove the syringe and insert a cell stopper in each port:



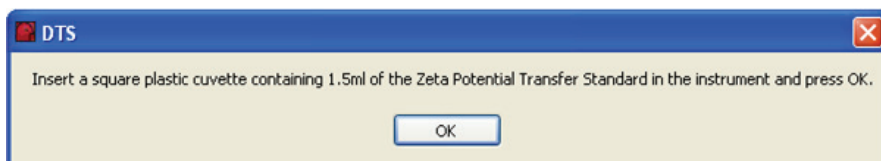
- j. Remove any liquid spilt on the outer part of the electrodes and the outside of the cell.

ill 7940

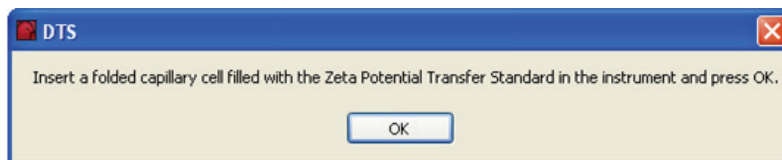
Load the cell

Depending on the test being run, one of these prompts is displayed:

For a **Size test**:



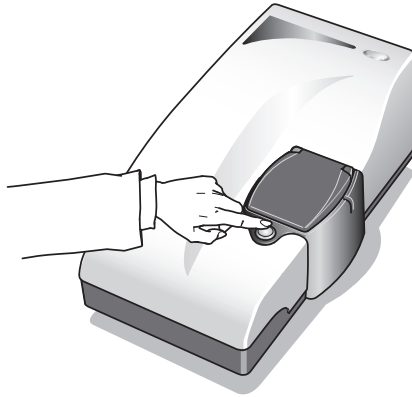
For a **Zeta potential test**:



Load the appropriate cell in the instrument, following the procedure below, then click **OK**.

Size test

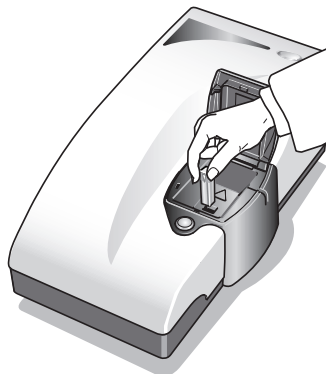
- a. Press the button to open the measurement chamber lid:



- b. Most cuvettes have a triangle or spot mark. This must face towards the **front** of the Nano: ill 7942

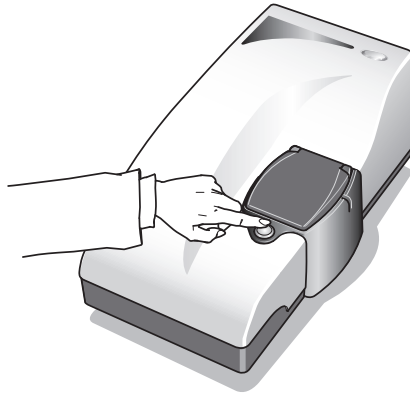


- c. Push the cuvette down so it is firmly located then push down the chamber lid: ill 8487

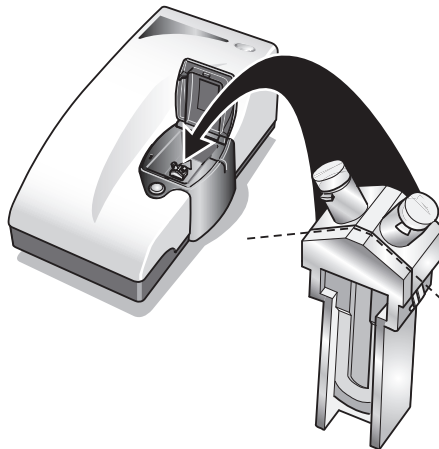
ill7944

Zeta potential test

- a. Press the button to open the measurement chamber:



- b. The cell has a weld line just behind the front surface, as shown here:



- c. Holding the cell near its top, turn the weld towards the front of the instrument. It **must** face the front of the Nano when inserted.

- d. Push the cell into the cell holder until it stops.



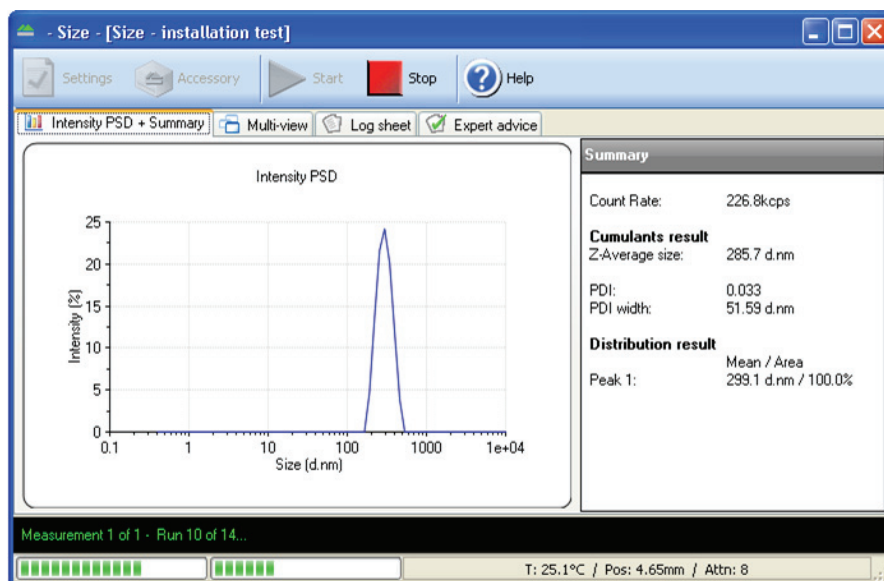
- e. Close the measurement chamber lid to cover the cell.

ill 7946

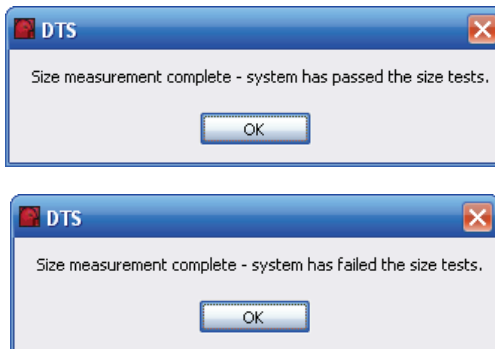
The test runs - pass or fail?

Each test should take no longer than about six minutes.

- a. After a two minute thermal equilibration period, the window will show the test running, like this:



- b. The test reports whether the system passed or failed, thus:



- The instrument is **setup correctly** if the performed test or tests **pass**.
- If testing **both** size and zeta potential, after the Size test the instrument prompts for the capillary cell for the Zeta potential test.
The instrument is only set up correctly if both tests pass.

**Note**

The results will be stored as a record in the measurement file **Installation test.dts**.

In case of failure....

If a **failure** message is displayed for either test type, repeat the measurement as described here.

- a. Insert a new sample in a new cuvette/cell and measure it, **ensuring that**:
- The correct cell type is used.
 - The measurement chamber lid is closed properly.
 - There are no bubbles in the sample.
 - The cell is clean and free from fingerprints, grease and dust.
- b. In addition, for a **Size test**:
- Check that between 1.0mL and 1.5mL is injected into the cuvette (giving a sample depth of 10mm to 15mm as shown in Step 4 above).
 - Check that the triangle on the cuvette faces forward (see step 5 above).
- c. In addition, for a **Zeta potential test**:

- Wet another cell thoroughly using ethanol or methanol as described earlier, then check that there are no scratches on it. Wipe it dry with a lint-free cloth (we recommend camera lens cleaning pads). **Do not try to clean the optical area on the front of the “U” part of the cell as this will cause small scratches which can distort the result.**
- Check that the capillary cell is full.
- Ensure that the cell plugs are inserted firmly.

Finally....

If the test continues to fail, contact the local Malvern representative (before calling make a note of the instrument’s serial number.)

Part 3: Making other measurements

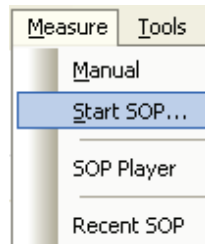
Introduction

Once the instrument is setup (chapter 1) and its performance validated (chapter 2), it is ready for use. Measurements are made using **Standard Operating Procedures** (SOPs) as described in this chapter.

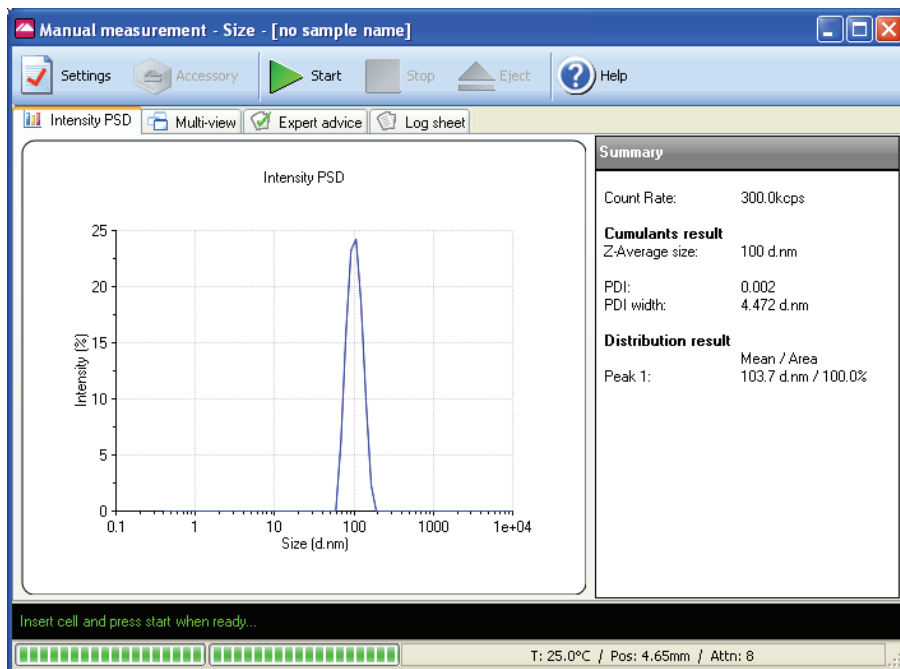
Malvern Instruments supplies some default SOPs, others may be created by supervisors/advanced users.

To run an SOP:

1. Select the command **Measure-Start SOP**:



2. Available SOPs are listed in a selection window. Select the SOP to use and click the **Open** button.
3. Follow any on-screen instructions to run the SOP. Clean and load the cuvette or cell exactly as described above for the self-installation test.
4. As the SOP analysis runs, results will be displayed, as in the following example:



5. Note the messages in the black status bar (near the base of the window) which show the progress of the measurement.
6. When the measurement finishes, close the window using its  button.
7. The results will be stored as the latest record in the measurement file currently open.
To view the result, select this record and then click one of the Report tabs. The following examples displayed on the next page show:
 - The **Intensity PSD (M)** report for a **size** test (top report).
 - The **Zeta potential (M)** report for a **zeta potential** test (lower report).

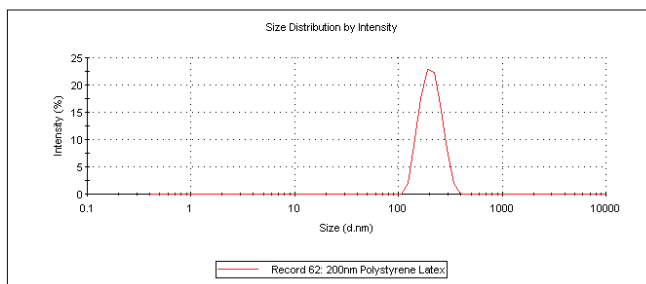
Intensity PSD (M)

Sample Name:	200nm Polystyrene Latex	
SOP Name:	200 size plastic cell.sop	
File Name:	Example Results 8.xls	Dispersant Name: Water
Record Number:	62	Dispersant Rf: 1.330
Material Rf:	1.59	Viscosity (cP): 0.8872
Material Absorption:	0.01	Measurement Date and Time: 30 May 2008 16:25:25

Intensity PSD (M)
report for a size
test

Temperature (°C):	25.0	Duration Used (s):	60
Count Rate (kcps):	317.9	Measurement Position (mm):	1.05
Cell Description:	Glass cuvette with round aperture	Attenuator:	3

	Diarn. (nm)	% Intensity	Width (nm)
Z-Average (d.nm): 200.0	Peak 1: 208.9	100.0	48.08
Pdi: 0.012	Peak 2: 0.000	0.0	0.000
Intercept: 0.945	Peak 3: 0.000	0.0	0.000
Result quality: Good			



ill 8488

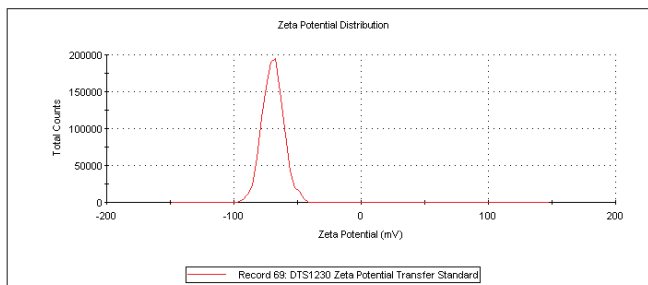
Zeta potential (M)

Sample Name:	DTS1230 Zeta Potential Transfer Standard		
SOP Name:	Test Zeta standard.sop		
File Name:	Example Results S.dts	Dispersant Name:	Water
Record Number:	69	Dispersant RI:	1.330
Date and Time:	30 May 2008 15:08:15	Viscosity (cP):	0.8872
		Dispersant Dielectric Constant:	78.5

Zeta potential (M)
report for a zeta
potential test

Temperature (°C):	25.0	Zeta Runs:	12
Count Rate (kcps):	165.6	Measurement Position (mm):	2.00
Cell Description:	Clear disposable zeta cell	Attenuator:	8

	Mean (mV)	Area (%)	Width (mV)
Zeta Potential (mV): -69.4	Peak 1: -69.4	100.0	8.23
Zeta Deviation (mV): 8.23	Peak 2: 0.00	0.0	0.00
Conductivity (mS/cm): 0.331	Peak 3: 0.00	0.0	0.00
Result quality : Good			



ill 8189



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