LISST-PORTABLE

LASER DIFFRACTION PARTICLE SIZE ANALYZER

SEE REVERSE SIDE FOR FURTHER INSTRUCTIONS

MEASURE

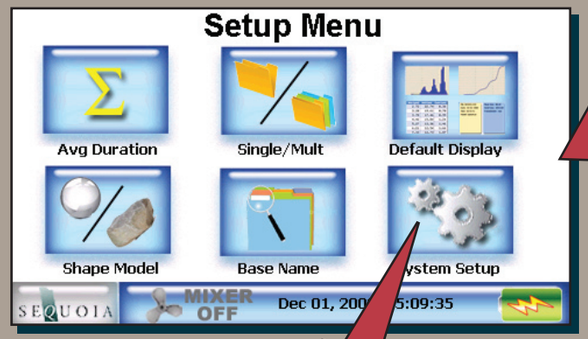
1. Rinse chamber
2. Get background
3. Add sample
   - View rings
   - Add notes
4. Acquire average (no input required)
5. Compute size distribution (no input required)
6. Display results

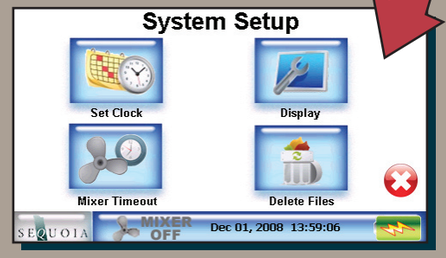
DISPLAY

1. Select file to display
2. Multiple samples in file? (no input required)
   - YES → 3. Select sample number to display
   - NO → 4. Display results

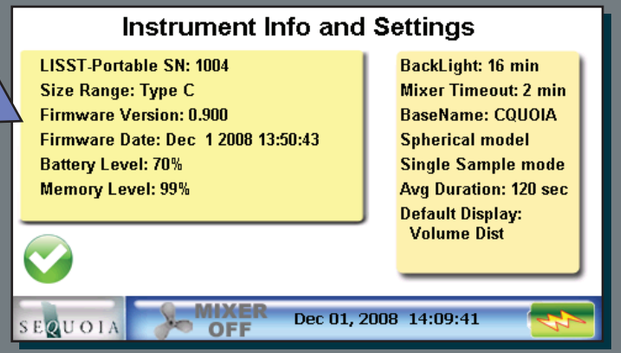


SETUP





INFO



TOOL BAR

- Return to the Main Menu
- Toggle mixer on and off
- Proceed to the next screen
- Cancel entries and return to the previous screen
- Battery level indicator
- Battery is charging

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SETUP MENU

Average Duration
The amount of time over which scattered light is measured while calculating the size distribution is selectable between 5 and 120 seconds. Default is 5 seconds.

Single or Multiple
Results can be stored in separate files or be appended to one file. Select Single Sample to store each sample in a separate file. Select Multiple Samples to store several samples in the same file. It is possible to toggle between the modes from sample to sample. Default is Single Sample.

System Setup
In the system setup, you can set the clock, delete files one by one (for multiple file deletion we recommend using the Windows ® software), set the backlight time-out (1-16 minutes, default is 5 minutes), screen brightness and set the mixer time-out (1-16 minutes, default is 10 minutes). Lower values means longer battery life. The mixer time-out determines for how long the mixer will run if the user forgets to turn it off.

Shape Model
For computation of the size distribution, it is possible to choose between two different mathematical models for inversion of the raw data; Spherical and Random Shape. The default setting is Spherical Shape.

Base Name
A base name with a maximum length of 6 characters can be input, e.g. 'Sample'. The instrument will subsequently add the sample number to the base name if Single Sample per file is chosen (e.g Sample01.asc, Sample02.asc), up to 99. If Multiple Samples per file is chosen the instrument will store each new sample in a new line in the file (Sample.asc).

Default Display
The processed data can be viewed in four different ways: as a graph showing the volume distribution, as a graph showing the cumulative distribution, in a table format and as a statistics summary. In Default Display you select which of these four options will be shown first when the results are being displayed (the other three can be viewed by clicking a tab). Default is Volume Distribution.

LISST-PORTABLE
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USERS GUIDE

SAMPLE ANALYSIS

Measure Menu
The measuring process is largely selfexplanatory via written instructions and pictures on the touch panel display. Steps 1 through 3 requires the user to flush the measuring chamber, obtain a background measurement in clean water, add the sample in the correct concentration and then start the measurement. The subsequent steps (4-6) are automatic.

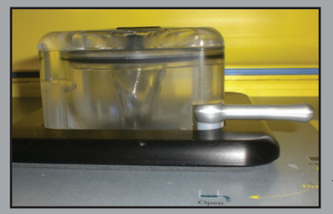
Step 1: Rinse chamber
It is important to rinse the mixing chamber well with clean water before proceeding with a measurement. Filtered or deionized water works well. Make sure the drain is closed, fill the chamber with water, turn on the mixer for a few seconds, then drain the chamber and fill again with clean water. One rinse is usually enough to flush out the previous sample and clean the optical surfaces. After the last rinse, turn off the mixer, leave the clean water in the chamber, and proceed to Step 2.

Step 2: Get Background
The LISST-Portable detects light scattering from particles and water at 32 angles using 32 ring shaped silicon detectors. In order to separate the scattering from particles and water from that of pure water a background measurement obtained in clean water is needed. The background measurement is of great importance for the quality of the data. In order to obtain a new background, click the UPDATE button. To use an existing background, click NEXT. If the instrument has just been switched on, the factory background will be used if no new background is obtained.



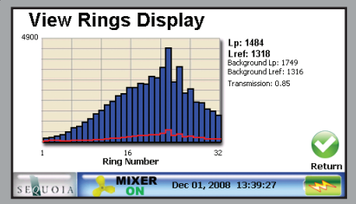
Upon obtaining a background, the red line shows the factory background and the blue bars show the current background. They should be close together, and the transmission should be in the range from 0.95 to 1. Strongly increased values on the middle rings suggest dirty windows. Increased values on the inner rings, together with a transmission value significantly below 1 suggests the optics has been misaligned. Consult Sequoia for a diagnostics of how serious the problem is and how to proceed.
The figure above suggests the windows are slightly dirty (increased values on middle rings), but not too seriously (transmission is above 0.95). When a satisfying background has been obtained, proceed to Step 3.

Step 3: Add Sample
When pouring the sample into the mixing chamber, be sure to fill up the mixing chamber completely and seal it with the black cap. Otherwise a vortex will form when the pump turns on and cause bubbles to form in the optical cell. Bubbles will be detected as particles by the instrument and thus cause erroneous data.



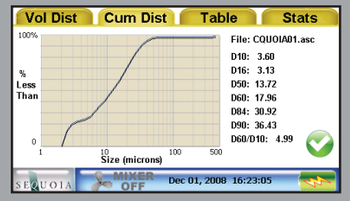
A vortex forms if the mixing chamber is not filled completely.

After having added the sample, you may want to add a note. Click the grey Note box and enter your note (maximum length of 50 characters).
The view rings option in step 3 is useful to monitor how much signal the particles create above the current background level:



The red line is now the current background and the blue bars the current signal detected by the rings. The higher the bars are, relative to the red line, the better the signal-to-noise ratio. In the example above, it is evident that there is a very strong signal relative to the background, thus excellent signal-to-noise.

Once you are satisfied with the note and the sample signal, click next to let the instrument acquire the actual measurement. Upon data acquisition the data will be processed and the data displayed using the setting selected in Default Display. In the figure below, the default setting was Cumulative Distribution. Click the tabs to view the data using the other display options.

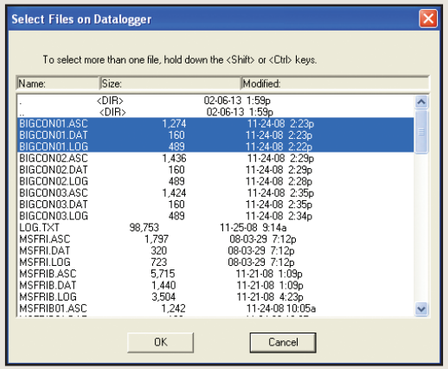


Using the WINDOWS SOFTWARE

The main purpose of the Windows® software is to provide for data download and multiple file delete. Make sure the LISSTPortable is turned on. Connect the instrument to the serial port on your PC (or to a USB port using the supplied adapter). Open up the LISST-StreamSide SOP and click the traffic light to connect to the instrument. This enables the icons (Query Instrument, Download Data, Erase Data, Set Clock, Terminal Window, Serial Port Settings).



Clicking "Download Data" or "Erase Data" opens up a dialog box for selecting files to offload or delete. There are three file types associated with each filename, with extensions .ASC, .DAT and .LOG. Be sure to select and offload/delete all extensions.



The .ASC file contains the processed data and can be read into a spreadsheet in comma-separated format. The .DAT file contains the raw data in a binary format and is used for diagnostics purposes by Sequoia. The.LOG file contains the settings for each file and sample.

MAINTENANCE and CLEANING

The LISST-Portable is a high-precision optical instrument. Avoid mechanical shocks and impact to the housing, as this may cause misalignment of the optical parts.

Avoid scratching the touch panel display. Clean the panel using only lukewarm water and a soft cloth. Do not use abrasive cleaners.

For cleaning of the windows, rinse out the mixing chamber with clean (filtered or de-ionized) water several times in order to flush out all particles from the instrument. Then gently wipe the windows in the optical cell with a cotton swab dipped in a mild soap solution (e.g. hand wash soap). Then rinse several times with clean water and check the background.



Cleaning the optical windows using a cotton swab

For storage for more than a few days, clean the windows as described above, put the lid on the mixing chamber to avoid dust falling into it and store the instrument in a dry location.

The instrument is powered by rechargeable batteries. If charged with the supplied power adaptor they can not be overcharged. The battery should be charged before long term storage.

Problems connecting to the instrument
Check the LISST-StreamSide SOP to make sure the Serial Port Settings are set correct: 9600 baud, File Offload Baud Rate: 115200.

Notes on notes.
Maximum note length is 50 characters. Commas (,) in the note will cause it to spread across several columns when opened as a comma-separated file. This can be useful for entering information in the notes that can subsequently be used to sort the data, e.g. after the name of the user, sample location, etc.

Data problems?
If you are having problems with your data, send us an email containing the .DAT and .LOG files you are in doubt about (we can not do diagnostics from the .ASC file), together with the serial number of the instrument.

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