Quick manual for Serstech 100 Indicator

Serstech 100 Indicator is used for identifying liquid or solid samples.

Laser Safety Considerations

Care should be taken when Serstech 100 Indicator since the instrument uses a laser that potentially can give eye damage. Do not use the product unless you have been trained in laser safety.

This is a Class 3B laser product and complies with EN 60825-1:2007. Ensure the beam is always terminated at a suitable non-specular (i.e. non mirror-like) surface. Do not direct the beam at other people or into areas where other people unconnected with the laser work may be present. Refer to the International standard EN 60825-14 user's guide for guidance on identifying and controlling hazards associated with laser use.

Always ensure the laser is turned off when changing measuring accessories, e.g. from point-and-shoot adapter to vial holder.

WARNING: Exposure to levels of laser energy above the MPE can be harmful to the eye. The minimum safety distance (Nominal Ocular Hazard Distance, NOHD) is 100 cm from the laser aperture in order to avoid exposure to levels above the MPE. Always avoid exposure to the beam.

Use administrative controls, engineering controls, and/or laser safety glasses to avoid exposure to laser radiation within the 100 cm hazard zone. Use laser safety eyewear of an optical density (OD) greater than 3.

WARNING: Scanning a thermally sensitive material may cause burning of the target. If the sample is contained in a tightly sealed vessel (e.g. a capped vial), pressure may build up during the scan, causing subsequent explosion of the vessel.

Calibration

Make sure that the instrument is fully charged and calibrated before use. Calibration should be performed at the beginning of each work shift or once/day. Use the supplied polystyrene calibration target (black cap). Also, see to that an adequate adapter is used for the sample.

Using the screening method

The information in this section is relevant for embedded firmware versions 3.0.9 and 3.0.10.

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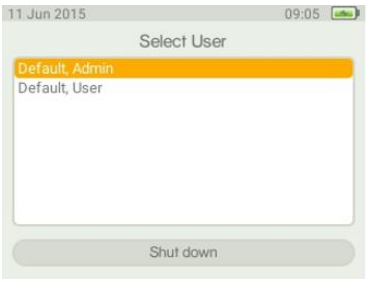
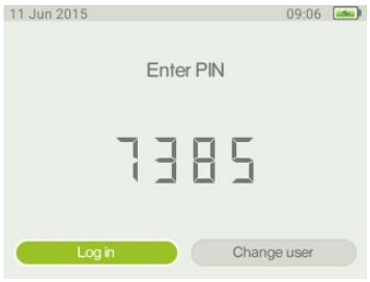
1. Start the instrument by pressing the power button  .
2. Toggle with ▼ ▲ to select user. Press OK.
3. Use ▼ ▲ to change value of each digit. Use →I to change between digits.
4. Press →I to high light Login, then OK.

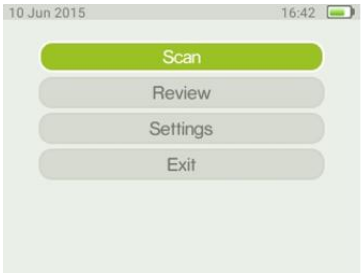




2. 3. 4.

5. Choose scan (using ▼ ▲) and press OK.
6. Select Scan settings (using ▼ ▲) and press OK.

7. Make sure that the correct Threshold (Screen & Verify) is set. Press→I to move between the fields, use ▼ ▲ to adjust threshold to 80.0% if not already set. Move to Save using →I and press OK.



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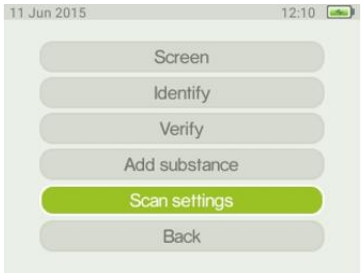

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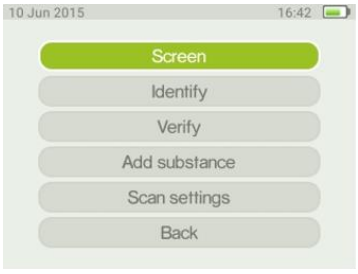
8. Press →I to move to Screen and press OK.
9. Make sure that the correct database(s) is selected. Press →I to activate the database selection. Move between databases using ▼ ▲. Select/deselect database by pressing OK. Press →I to highlight Proceed (labelled green)). Press OK.
10. Make sure Auto exposure is activated. To alter settings press →. Press OK to activate/inactivate auto exposure. Use →I to activate Start scan (labelled green when activated). Place the sample in position and press OK. Take care to avoid direct sunlight or other light sources from entering the instrument during the measurement.



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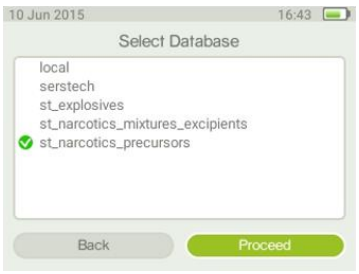

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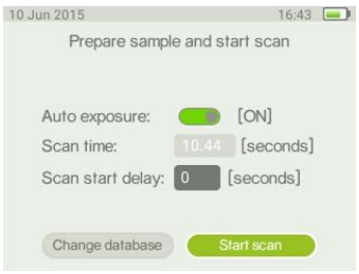
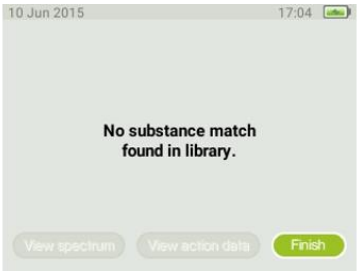


10.

11. If the substance identified is present in the selected database the screen has a red background colour and the name of the substance is presented. Use →I to move to the field Finish and press OK to analyse next sample.
12. If no substance match is found in the library a grey screen with this information is presented. Use →I to move to the field Finish and press OK to analyse next sample.
13. If the spectral quality is too low a grey screen id displayed with the text "*Inconclusive result. Please check the positioning of the sample and make sure any stray light from the environment is minimized, e.g. sunlight entering the instrument*". This indicates the spectrum is of too low quality for analysis. Adjust according to recommendations and run the sample a second time. Note that Raman inert samples or highly fluorescent samples will give poor spectral quality. Thus, repeated analysis of the same sample, rendering poor spectra quality, indicate that the sample is not suitable for this type of analysis. Use →I to move to the field Finish and press OK to analyse next sample.

11.



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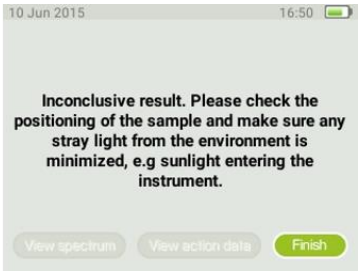

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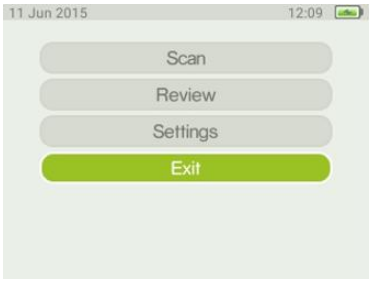
14. To turn off the instrument press the Menu button and use ▼ ▲select Home. Scroll down to Exit using ▼ ▲ and press OK.
15. Use ▼ ▲to select Shut down and press OK.



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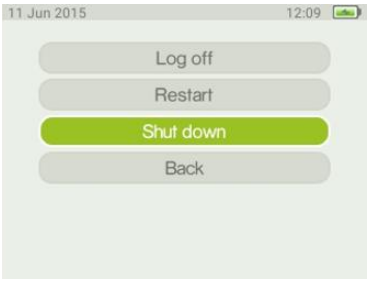

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Attachment 1

Sample presentation and adapters

Vial holder

The vial holder is easily mounted pressing it in position, until it snaps on, and subsequently removed by pulling off. Make sure the laser is not activated during the procedure.

Point and shoot adapter

The point and shoot adapter is mounted by pressing in position, until it snaps on and pulling apart. Make sure the laser is not activated during the procedure.

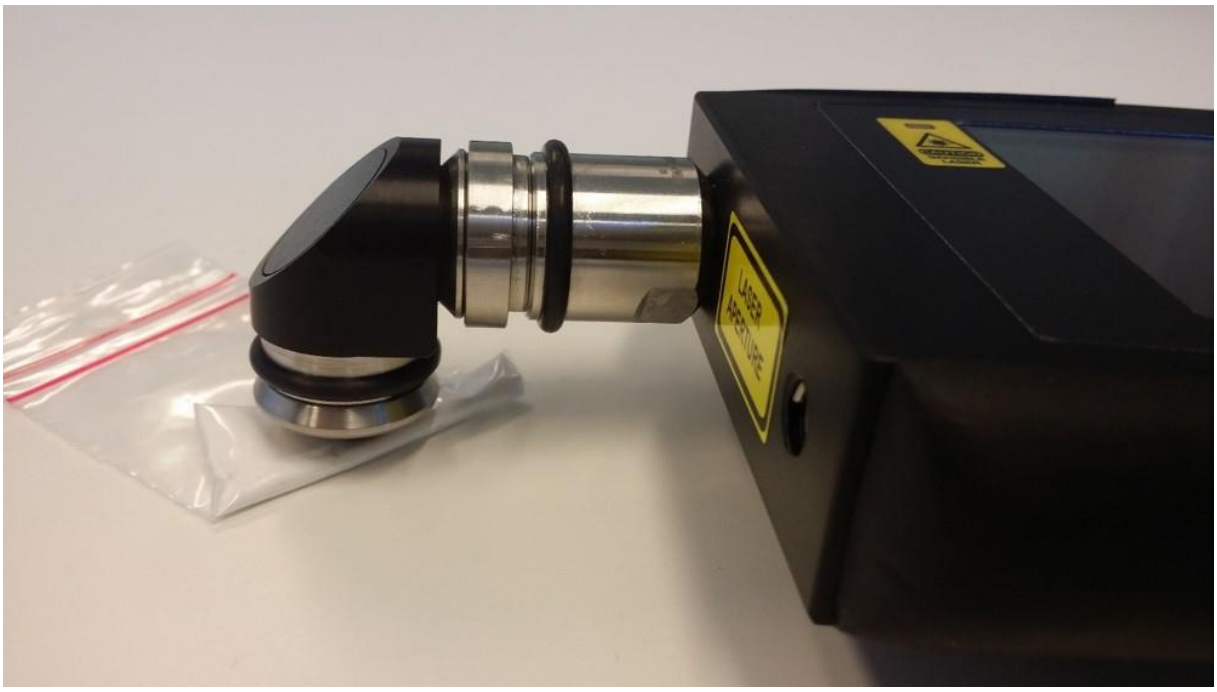
Straight and angled lens tube

The instrument is delivered with a 90^{o} angled lens tube that improves ease of operation for solid samples. Both the straight lens tube and the angled lens tube can be used with the vial holder or point and shoot adapter. Tools, supplied with the instrument, are required for changing lens tubes. Note that the instrument shall be turned off whilst changing lens tube. Make sure the laser is not activated during the procedure.

Fitting angled adapter

Picture above shows fitting of angled adapter with a point and shoot adapter mounted.

Analysis of solid samples, preferred method



Solid samples are preferably analysed using the angled adapter. The instrument can rest on a table with the point and shoot adapter aimed at the sample, leaving the analyst hands free. In addition, this mode reduce the risk of stray light entering the instrument during analysis.

Analysis of solid samples, alternative method

Analysing samples using the straight lens tube is another method. However the risk of stray light affecting the measurement is increased. Make sure no person is in the hazard area potentially illuminated by the laser during measurement, i.e. within 1 meter from the laser aperture in front of the instrument.

Analysis of liquids in vials

If the sample can be transferred to a 4 ml vial the vial adapter is the preferred choice.

Analysis of liquids in larger vessels

If it is not possible to remove the sample to a vial for analysis it is possible to analyse straight thorough the vessel (e.g. Plastic or glass). Make sure that no adapters are used and that lens tube is pressed against wall of the vessel to assure that the analysing beam collects information from the sample inside the wall of the vessel. Note that the vessel must be transparent for the analysis to be successful. Brown glass material is usually no problem, but semi-transparent plastic containers sometimes reduces spectral quality too much. Make sure no person is in the hazard area potentially illuminated by the laser, i.e. within 1 meter from the laser aperture in front of the instrument.

Attachment 2

Challenges in narcotics identification

Biological samples (e.g. Psilocybin mushrooms, Marijuana, Hashish, Opium or Poppy seeds) are hard samples. The illicit substance often is in low concentration or in a complex matrix that may give undesirable background (i.e. fluorescence) that will hamper or inhibit the ability to identify the sample. This type of samples should preferably by identified using other techniques. Note that synthetic cannabinoids often are sprayed onto tobacco greatly reducing the possibility to identify these substances using Raman,

Tablets. Many pharmaceutical substances are regulated as narcotics. These type of samples are challenging in that low dosage can render spectra where the signal from the narcotic substance is not sufficient to identify the narcotics. Further, tablet coating (e.g. titanium dioxide, figure 1) may prevent the analysing beam to obtain signal from the material below the coating. This is solved through simply cutting the tablet in half and analysing the interior of the tablet.

Figure 1. *Tablet with titanium dioxide coating. Cut to allow identification of composition.*

Inhomogeneous distribution (solid samples). Pharmaceutical formulations and cut narcotics may have an inhomogeneous distribution of the drug. Thus, there is a risk that the analysed part of the samples only contains the excipient (cutting agent). To ascertain that the analysed fraction of the sample is representative for the entire sample is an issue in sampling for all analytical techniques. We recommend that five different analyses are performed from different regions of the sample. When an illegal substance is identified no further analyses are required regardless of the number of analyses performed. The sample size and/or local procedures for sampling may of course affect the number of analyses.

Samples dissolved in organic solvents. Dissolving narcotic substances in solvent that have a very high Raman signal will mask the presence of the illicit drug. However, procedures to use the Serstech 100 Indicator to identify the solvent and subsequently evaporate the solvent, if safety requirements for the identified solvent allow this, and collect the remaining drug for analysis with the Serstech 100 Indicator.

Black samples. Black samples pose a problem in Raman analysis since the laser light emanating from the instrument is absorbed by the sample and may cause the sample to start burning. Mixing narcotic substance with black powder (e.g. active carbon) will hamper or make it impossible to identify the narcotic substance. This problem can be overcome by dissolving the sample in a suitable solvent (e.g. acetone) and rinse the black particulates away using a 0.22 µm disposable syringe filter. The solvent from dissolved sample is subsequently evaporated off and the remaining substance is collected and identified using the Serstech 100 Indicator. The prerequisite for this analysis is that the black powder is insoluble in the used solvent.

Fluorescence. Fluorescence is a phenomenon affecting the quality of the collected spectra negatively. The origin of fluorescence can be from small amount of fluorescing impurities in the sample. However, some narcotic substances have inherent fluorescence that lower the spectral quality and thus are harder to identify using Raman spectroscopy. Heroin and MDMA exhibit fluorescence. Alternative techniques can be considered for these samples.