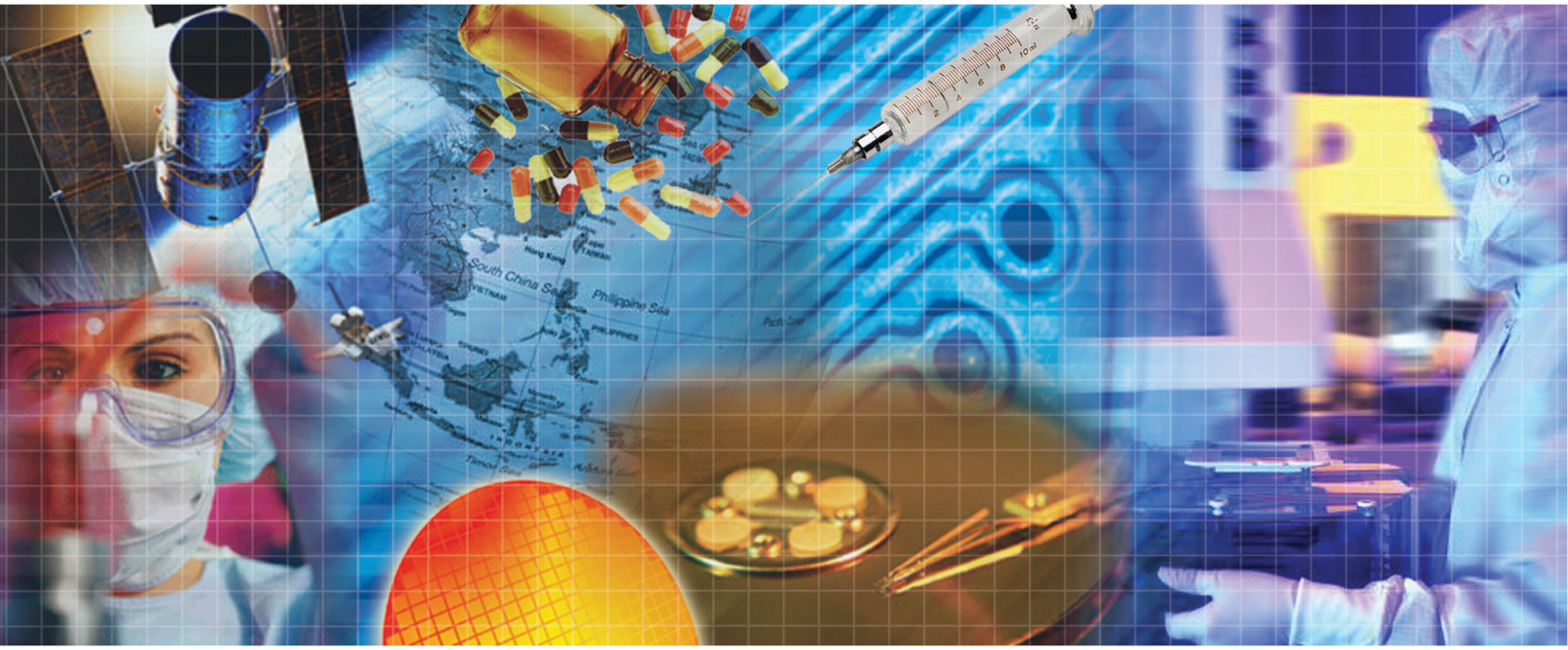

LIGHTHOUSE
WORLDWIDE SOLUTIONS

LIQUID SAMPLER
LS-60

Liquid Particle Counter

Operating Manual

Lighthouse Worldwide Solutions

Liquid Sampler LS-60

Operating Manual

Manufactured by:

Lighthouse Worldwide Solutions

1221 Disk Drive

Medford, Oregon 97501

LWS Part Number: 248083289-1 Rev 5

LIGHTHOUSE
WORLDWIDE SOLUTIONS

EU DECLARATION OF CONFORMITY

Manufacturer's Name: Lighthouse Worldwide Solutions, Inc.

Manufacturer's Address: Lighthouse Worldwide Solutions, Inc.
1221 Disk Drive
Medford, OR 97501 USA

Declares that the product:

Product Name: Liquid Sampler
Model Number(s): LS-60

Conforms to the following Product Specifications:

SAFETY	EN61010-1:2001	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use Part 1: General Requirements IEC 61010-1:2000
	CAN/CSA C22.2 No. 1010.1-1992	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements
LASER SAFETY	IEC 60825-1 Am. 2 IEC 60601-2-22 (Laser Notice 50)	Guidance on Laser Products: Conforms to FDA 21 CFR Chapter 1 Subchapter 1
EMC	EN61326	Electrical Equipment for Measurement, Control and Laboratory Use EMC Requirements Part 1: General Requirements Includes Amendment A1:1998; IEC 61326:1997 + A1:1998

UL 61010A-1 - UL Standard for Safety Electrical Equipment for Laboratory Use; Part 1: General Requirements
Replaces UL 3101-1

Supplementary information
The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC amended by Directive 93/68/EEC and the EMC Directive 89/336/EEC amended by Directive 93/68/EEC and carries the CE marking accordingly.

Fremont, CA. March 7, 2008

William Shade - V.P. Engineering

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About this Manual

This manual describes the detailed operation and use of the Lighthouse Liquid Sampler LS-60.

Software License Agreement

SOFTWARE PROGRAM: LIGHTHOUSE LIQUID SAMPLER LS-60

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Lighthouse Worldwide Solutions
Tel: 1-800-945-5905 (Toll Free USA)
1-541-770-5905 (Outside of USA)

Text Conventions

The following typefaces have the following meanings:

Note: *A note appears in the sidebar to give extra information regarding a feature or suggestion.*

WARNING: ***A warning appears in a paragraph like this one. A warning tells the user that doing something incorrectly could result in personal injury, damage to the instrument or loss of data.***

italics	Represents information not to be typed or interpreted literally. For example, *file* represents a file name. Manual titles are also displayed in italics.
boldface	Introduces or emphasizes a term.
`Courier font`	Indicates command syntax or text displayed by the diagnostic terminal.
`Bold Courier`	Indicates commands and information that is typeed. Upper or lower case letters may be used; in this manual, commands are shown in upper case.
Helvetica Italics	Indicates a comment on a command or text output.

Hexadecimal numbers are shown with the word “hex” or with a small “h” following the digits. For example:

```
hex 0D
0Dh
```

Additional Help

For more information about the Lighthouse Liquid Sampler LS-60, contact Lighthouse Worldwide Solutions:

Lighthouse Worldwide Solutions

Service and Support
1-800-945-5905 (Toll Free USA)
1-541-770-5905 (Outside of USA)

www.golighthouse.com
techsupport@golighthouse.com

1 General Safety

Safety Considerations

Warnings and cautions are used throughout this manual. It is the responsibilty of the the user to familiarize themselves with the meaning of a warning before operating the particle sensor. Warnings may appear in the left margin of the page next to the subject or step to which it applies or within the step itself. Take extreme care when performing any procedures preceded by or containing a warning.

There are several classifications of warnings defined as follows:

WARNING: ***There are no user-serviceable components inside the article counter.***

- LASER - pertaining to exposure to visible or invisible LASER radiation.
- Electrostatic - pertaining to electrostatic discharge
- Network Connect - pertaining to communication ports and instrument damage

LASER Safety Information

This product is considered to be a Class 1 LASER product (as defined by FDA 21 CFR, §1040.10) when used under normal operation and maintenance. Service procedures on the sensor can result in exposure to invisible radiation. Service should be performed only by factory-authorized personnel.

The particle counter has been evaluated and tested in accordance with EN 61010-1:2012, “Safety Requirements For Electrical Equipment for Measurement, Control and Laboratory Use” and IEC 60825-1:2007, “Safety of LASER Products”.

WARNING: ***The use of controls, adjustments or procedures other than those specified within this manual may result in personal injury and/or damage to this instrument.***

For further technical assistance, contact our Technical Support Team at 1-800-945-5905 (Toll Free USA) or 1-541-770-5905 (Outside of USA).

Electrostatic Safety Information

WARNING: ***Using a wrist-strap without an isolation resistor will increase the severity of an electrical shock. Use of control or adjustment or performance of procedure other than specified here may result in hazardous radiation exposure.***

Electrostatic discharge (ESD) can damage or destroy electronic components. Therefore, all service or maintenance work should be done at a static-safe work station. A static-safe work station can be created by doing the following:

- Use a grounded conductive table mat and resistor-isolated wrist-strap combination
- Earth-ground all test instruments to prevent a buildup of static charge

2 *Introduction*

Overview

This operating guide describes how to use the Lighthouse Liquid Sampler LS-60.

The LS-60 has eight particle-size channels starting at 0.1 microns with a flow of 60 ml/min. A microprocessor controls all instrument functions. Count data is displayed as cumulative or differential count.

The instrument uses a laser-diode light source and collection optics for particle detection. Particles scatter light from the laser diode. The collection optics collect and focus the light onto a photo diode that converts the bursts of light into electrical pulses. The pulse height is a measure of particle size. Pulses are counted and their amplitude is measured for particle sizing. Results are displayed as particle counts in the specified size channel.

Description

Ergonomically designed, Lighthouse Liquid Sampler LS-60 is the newest and most advanced liquid sampler on the market.

Data is gathered and printed through the use of the included LS-60 Software.

The LS-60 Software allows the user to:

- Set the Sample Volume.
- Configure the number of samples taken.
- Print reports.
- Save your data for historical data review.

LIQUID SAMPLER Specifications

Size Ranges:	0.1 - 0.5µm; 0.2 - 2.0 µm; 0.3 - 3.0µm; 0.5 - 100µm; 2.0 - 140µm
Number of Channels:	8
Flow Rate:	60 ml per minute
Syringe sizes:	10 ml and 25 ml
Laser Source:	Laser diode
Maximum Sample:	1 Liter
Calibration	NIST Traceable
Wetted Parts:	Teflon (PFA), CTFE, ETFE, PTFE, Borosilicate Glass, Quartz, and Kalrez
Communication Modes	RS-232, RS-485 MODBUS (via proprietary cable)
Supporting Software	LS-60 Software
Enclosure	Stainless Steel
Power	Unit: +24VDC; AC/DC Adapter: 100-240V, 50-60Hz
Dimensions	12.875"(L) x 8.75"(W) x 14.75"(H) [32.7 x 22.2 x 37.5 cm]
Weight	20.5 lb (9.3 kg)
Operating Temp/RH	50°F to 104°F (10°C to 40°C) / 20% to 95% non-condensing
Storage Temp/RH	14°F to 122°F (-10°C to 50°C) / Up to 98% non-condensing

Table 2-1 Specifications

3 Operation

Overview

The Liquid Sampler LS-60 has been thoroughly tested at the factory and includes sample beakers and sample tubing for your convenience. Please review and perform instrument setup and configuration as outlined in the Read Me First document enclosed in the shipping container and included on the CD/Flash Drive.

Unpacking

It is presumed that when the shipment was received, the following took place:

1. The shipping container was inspected for damage;
2. If the container was damaged, the shipper was notified immediately.
3. The instrument was carefully inspected for broken parts, scratches, dents and other damage before use, even if the container appeared to be undamaged, and
4. Any damages were reported to Lighthouse Technical Support at 1-800-945-5905 (Toll Free USA) or 1-541-770-5905 (Outside of USA) before proceeding.

Verify the contents of the package against the shipping list. If anything appears to be missing, please contact your sales representative at Lighthouse Worldwide Solutions immediately at 1-800-945-5905 (Toll Free USA) or 1-541-770-5905 (Outside of USA) or techsupport@golighthouse.com.

To maintain your warranty, keep the undamaged shipping container and all packing material for reshipment of the instrument for annual calibration. Order replacement containers and packing materials only from Lighthouse, directly, or from a Lighthouse-authorized distributor.

Shipping Instructions

Should it become necessary to return the unit to the factory for any reason, contact Lighthouse Customer Service or visit our website, www.golighthouse.com/rma, and obtain a Return Merchandise Authorization (RMA) number. Reference this number on all shipping documentation and purchase orders. After receipt of the RMA number, follow the shipping instructions below:

WARNING: ***If the instrument is damaged during a return shipment due to inadequate user packing, the warranty may be voided and may result in additional repairs being billed to the customer.***

1. Use the original container, nozzle caps and packing materials whenever possible. Remove any instrument battery and package it to ship separately - refer to www.golighthouse.com/rma for detailed instructions. Remove attachments, such as TRH or Isokinetic probes, and package to prevent physical and ESD damage (TRH).
2. If the original container and packing materials are not available, you may contact Lighthouse to purchase replacement containers, packing materials and nozzle caps. It is not recommended, but wrapping the instrument in “bubble pack”, surrounding with shock-absorbent material and placing in a double-wall carton may work as substitutes. The instrument should not rattle around when the carton is vigorously shaken. If the instrument is damaged during shipment due to inadequate user packing, the warranty may be voided and all repairs required billed to customer.
3. Seal container or carton securely. Mark “FRAGILE” and write the Return Merchandise Authorization (RMA) number on any unmarked corner.
4. Return the instrument to the address provided by your Lighthouse representative or the RMA website.

Setup Requirements

The LS-60 comes with operating software that must be installed on a PC-compatible computer before the instrument can be used. The requirements listed below must be met before the software can be installed.

Computer Required

Note: *Configure the LS-60 and printer BEFORE installing the LS-60 Software. Refer to the LS-60 Read Me First and your computer manual for additional details.*

- The LS-60 does not have an "on-board" display or data storage memory and all functions are controlled by an external computer running the LS-60 Software. Each time the program starts, a new CSV file is created and count data is stored in this continually updated table. This file's name will be unique, based on the current date and time.

- Refer to the Read Me First document for the correct hardware configuration and additional instructions regarding the LS-60 before connecting the instrument to the computer.

Printer Setup

- At least one Windows printer must be installed and set to "Default Printer" *prior* to installing the LS-60 Software. If this is not done, generating reports from the software may not include all of the data stored by the program. Refer to the printer Owner's Manual or the Operating System manual for detailed information on how to do this.

Close all Running Programs

- Make sure that all programs that are not required and those that have active data or files open (including anti-virus programs) are shut down before installing the LS-60 Software. This will prevent possible conflicts and incomplete installation.

Power Down LS-60 when not in use

- It is recommended that the power switch for the instrument be switched OFF during periods of non-use.

Minimum Computer System Requirements

Note: *Installation of the LS-60 Software must be performed by a local system administrator.*

- The system requirements are illustrated in Table 3-1.

Table 3-1 System Requirements

Specification	Minimum Requirement
Processor speed	PC, 500MHz
System Memory	256 MBytes
Available Hard Disk Space	20 MBytes
Operating System (OS)	Windows 2000, XP
Video Resolution	1024x768, 256 colors
Input Devices	Keyboard, mouse, CD drive
Ports	1 unused serial port for instrument communication
Printing Reports	Local Printer

Software Installation

Read the Quick Start guide included in the CD case BEFORE installing the operating software. The LS-60 Software is installed by placing the Installation CD into the computer CD or DVD drive. The user must be logged on as the System Administrator or someone who has administrative permissions or the installation will fail. If the Windows Autorun feature is enabled for the drive, the installation should start within a few moments. If it does not start, it may be manually started by navigating to the CD/DVD drive's designator (such as D: or E:) and running Setup.exe.

Running the LS-60 Software

During installation, an icon resembling the instrument will be placed on the desktop. Double-click this icon to start the program. Navigating to the program icon from Start, Programs (or All Programs), Lighthouse Worldwide Solutions, LS-60 will accomplish the same thing.

Select COM port

After the “splash screen”, the program will attempt to access the instrument through a COM port; COM 1 is the program default. LS-60 will prompt the operator to select the correct port, as illustrated:

Figure 3-1 COM Port Dialog Screen

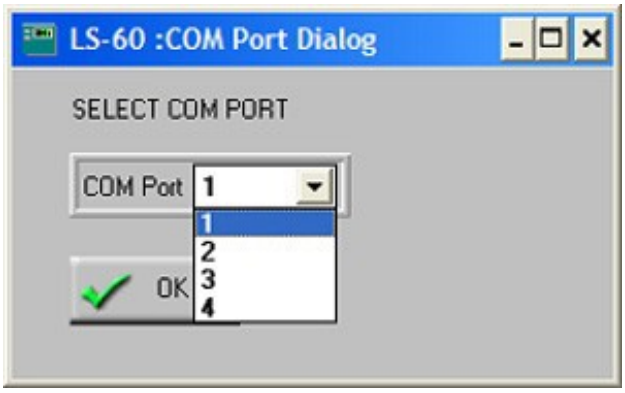


Figure 3-2 COM Port Selection Screen

If the wrong COM port is selected, an error message will be displayed and the instrument settings and channel sizes will not be loaded. Once the correct COM port is selected, this information will be loaded into the software.

Return platform to last 'set' position

Instrument Set Up

Figure 3-3 illustrates a successful program startup screen. From this screen, the operator can perform the following operations:

- Select COM Port, change syringe size, check sensor status or change data format
- Recipe load and edit
- Start or Stop sampling
- Flush the sensor
- Print data
- Raise and lower the platform
- Change Stirring speed

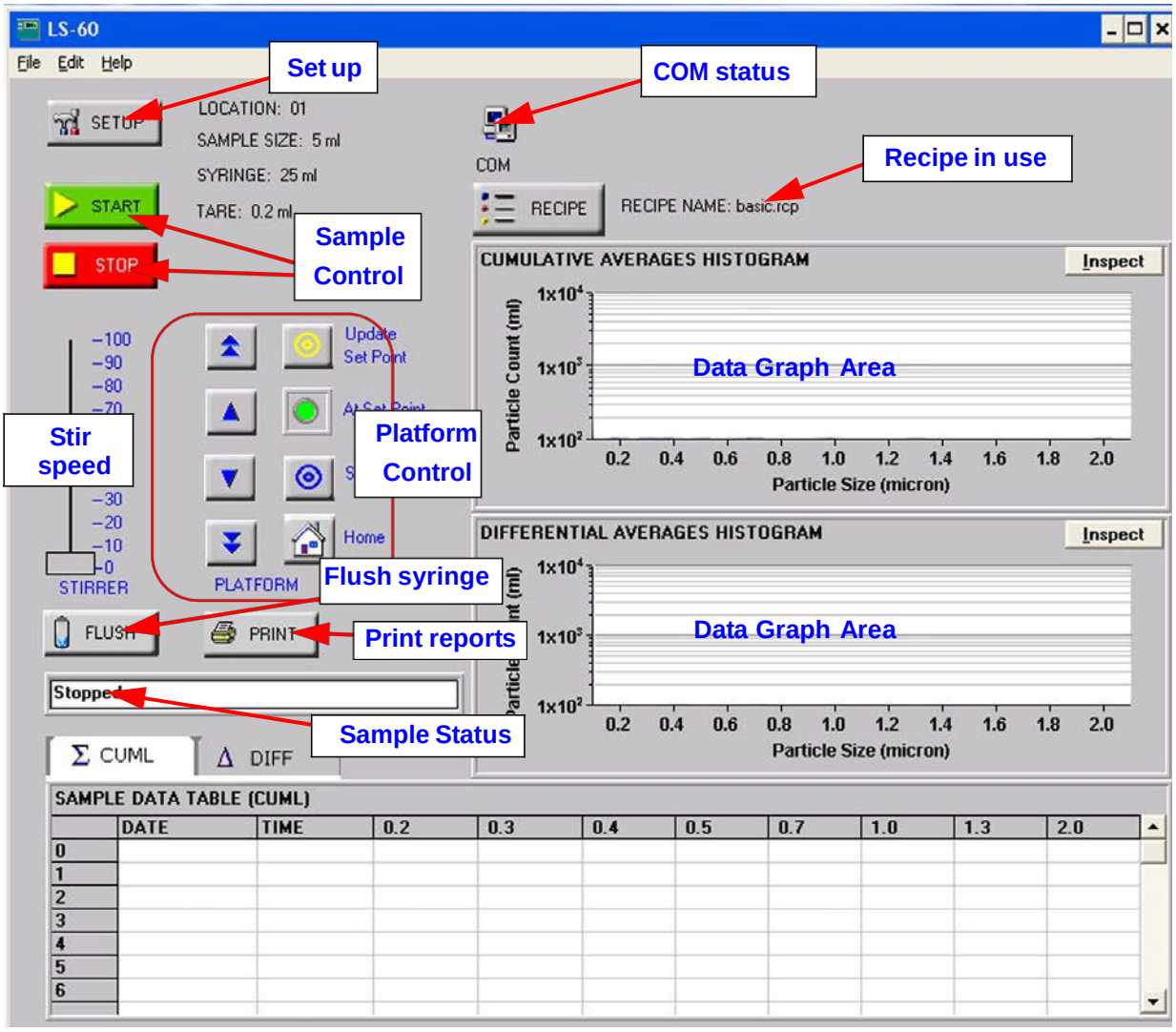


Figure 3-3 Program Main Screen - Layout Help 1

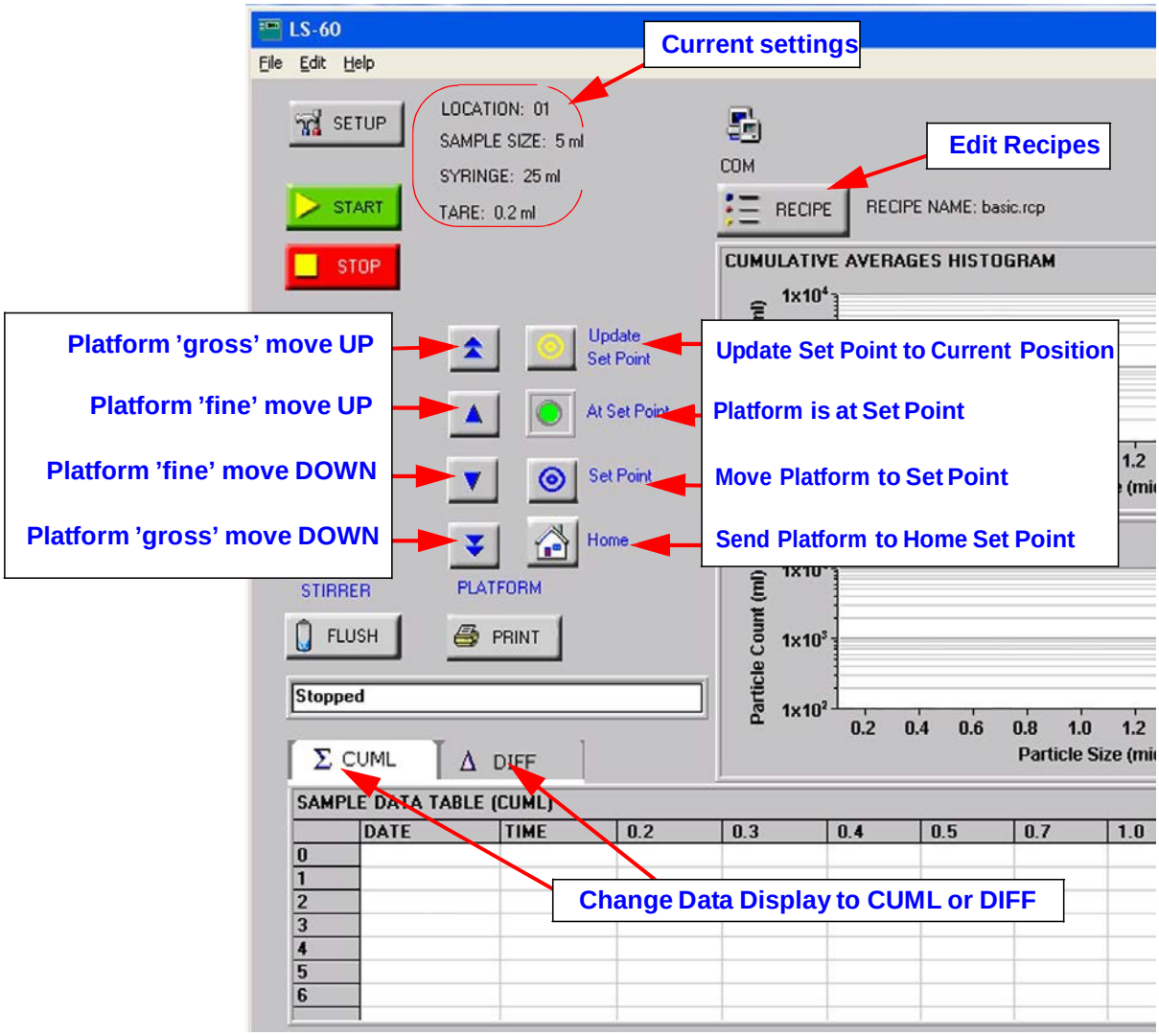


Figure 3-4 Program Main Screen - Layout Help 2

SETUP Menu

Clicking this button displays the SETUP Screen:

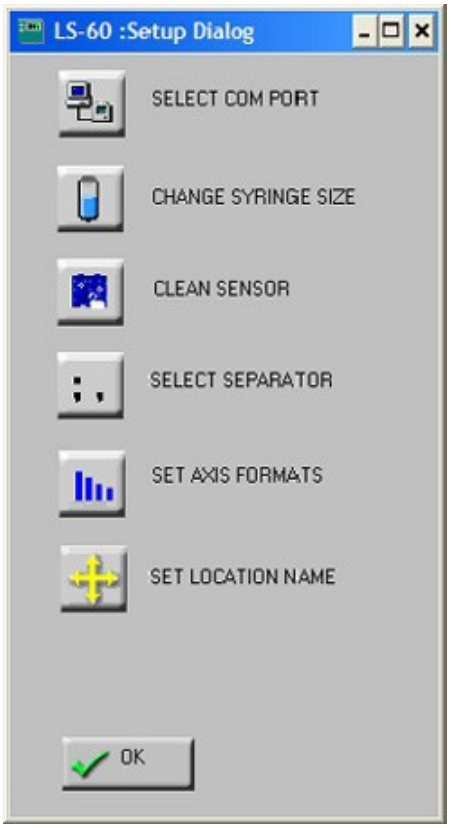


Figure 3-5 Setup Dialog Screen

SELECT COM PORT

This button allows changing of the COM port. COM port addresses above COM 4 are not currently supported.

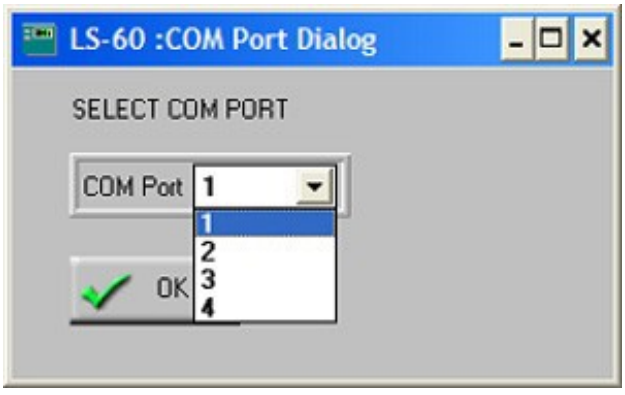


Figure 3-6 COM Port Dialog Screen

CHANGE SYRINGE SIZE

This button allows the operator to change the syringe between two sizes - 10 and 25 ml. See Figure 3-7.

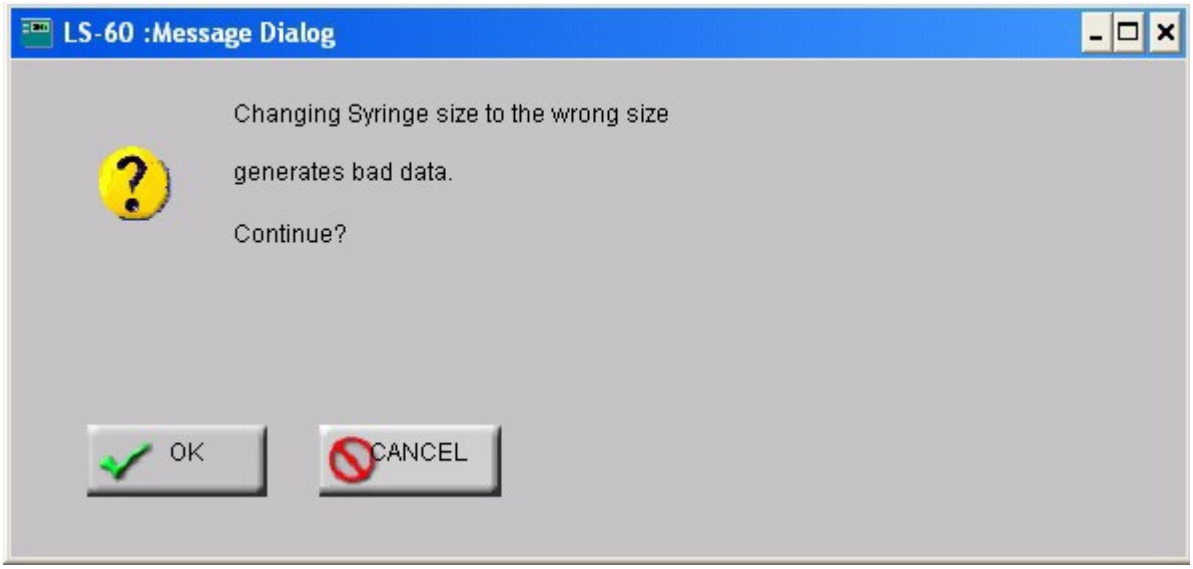


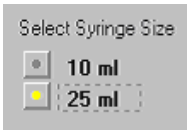
Figure 3-7 Syringe Change Warning Screen

Click OK to acknowledge and proceed to screen shown in Figure 3-8 or Cancel to return to the SETUP screen.

Figure 3-8 Get Syringe Size Screen

UNLOAD

This button moves the plunger to the bottom of its stroke so the latch pin can be removed and the syringe unscrewed from the valve.



SIZE

Select the size by clicking on the square next to the desired size.

LOAD

Clicking the LOAD button runs the plunger all the way up into the syringe so make sure the latch pin is properly attached to the plunger mechanism.

Clicking the OK button will return to MAIN screen, make the change in the software settings and update the instrument.

CLEAN SENSOR

This button runs a check of the sensor's condition, displaying a Calibration Reference value. If the instrument goes above a high limit, the flow cell needs to be cleaned (see **Cleaning the Sensor** later in this chapter) and the software will display a warning message. If the value drops below 50, the sensor may need repair - contact Lighthouse Technical Support for more information (refer to *About this Manual* for more information).

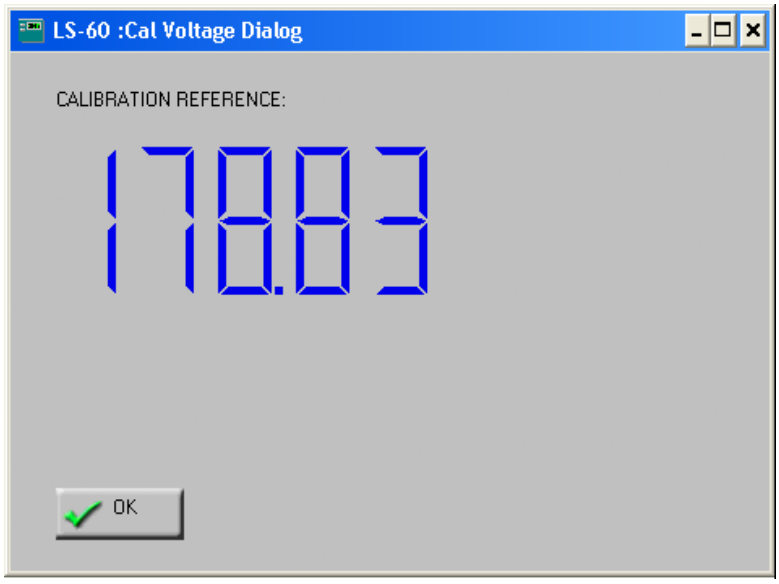


Figure 3-9 Cal Voltage Dialog Screen

The screen illustrated in Figure 3-9 will stay active until the OK button is clicked. This screen can be displayed while cleaning or flushing to determine if the process is effective. The window should be dragged to a position on the screen that allows concurrent viewing of the dialog screen and the **MAIN** screen so that the **FLUSH** button may be clicked to start the flush and the **DONE** button clicked to end it.

WARNING: ***Do NOT activate the FLUSH sequence if the sample tube has been removed, the output tube is disconnected or loose, or if there is no suitable flushing liquid available to be pumped through the sensor.***

Heed safety guidelines while handling the sample tube, beakers and output tube at all times. Do NOT flush sensor with caustic or corrosive chemicals - flush only with DI water or pure IPA, as required.

If a high reading cannot be resolved by flushing two or three times, cleaning with the cleaning brush and solution is required, followed by another flush. Refer to **Cleaning the Sensor** section for more information.

SEPARATOR

Changes the character used to separate data fields in exported data.

When exporting the file in a csv format, this button sets the data field separator as a comma. This supports US comma-delimited reporting through programs such as Microsoft™ Excel®.

This button sets the data field separator to a semicolon as used in Europe.

SET AXIS FORMATS

This button changes the format of the data displayed on the Histogram screen, as shown in Figure 3-10.

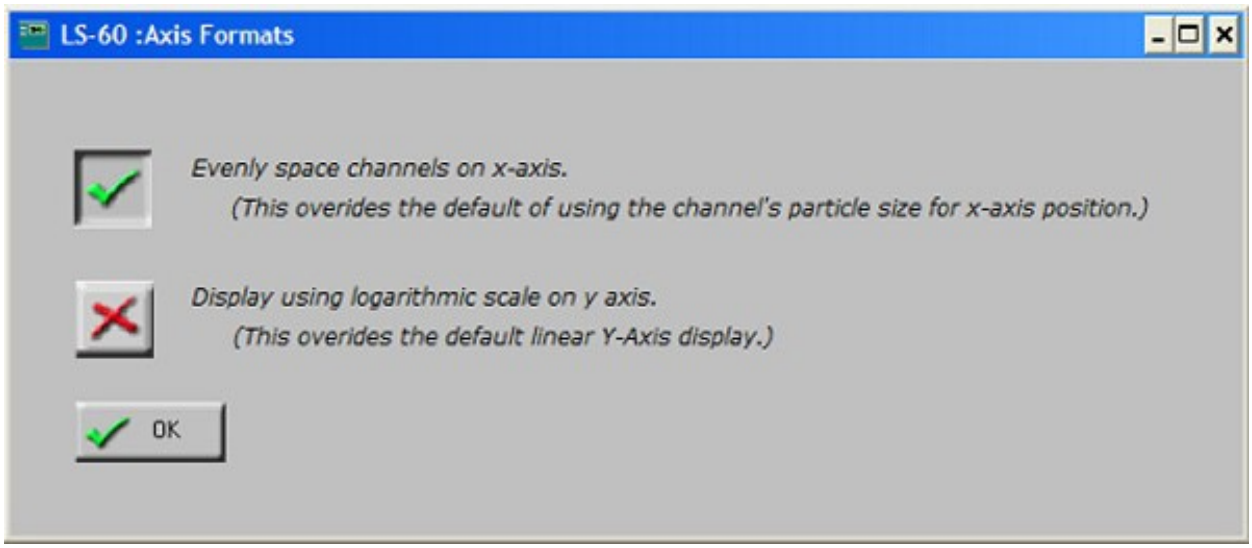
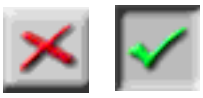
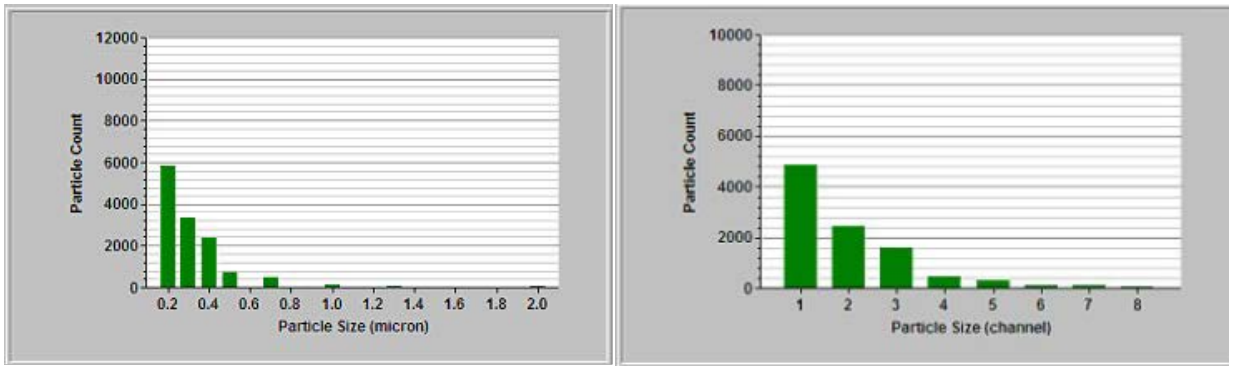


Figure 3-10 X-Axis Setting Screen

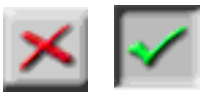


Clicking the "Evenly space channels on x-axis" button will change its state from a red X (disabled = channel sizes) to a green checkmark (enabled = channel numbers) and vice-versa. Clicking the OK button will save the setting and return to the SETUP Menu. The two screens are compared in Figure 3-11.



X-Axis Particle Sizes **X-Axis Channel Numbers**

Figure 3-11 Histogram Screen X-Axis Comparison



Clicking the “Display using logarithmic scale on y-axis” button will change its state from a red X (disabled = default scale) to a green checkmark (enabled = logarithmic scale). See Figure 3-12. Clicking the OK button will save the setting and return to the SETUP Menu.

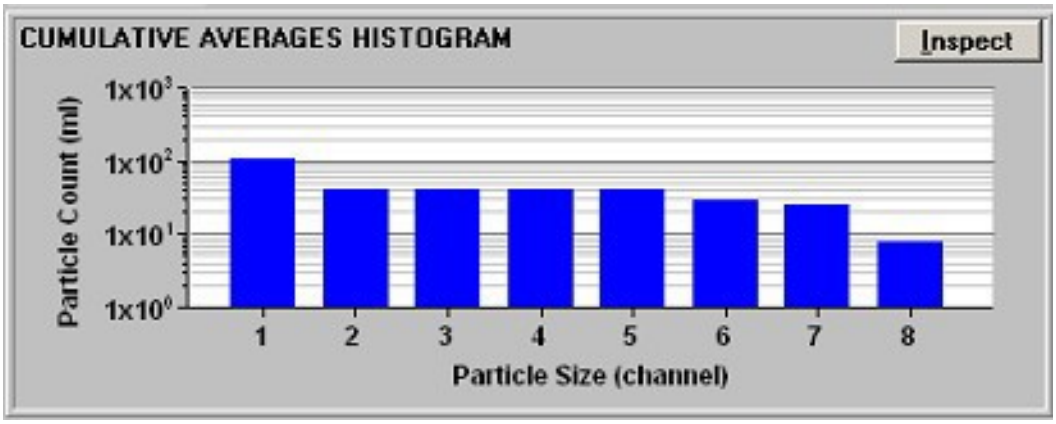


Figure 3-12 Histogram Screen Y-Axis Logarithmic Scale

SET LOCATION DESCRIPTION

This button allows a location description (maximum of 16 characters) to be entered for the LS-60. See Figure 3-13.

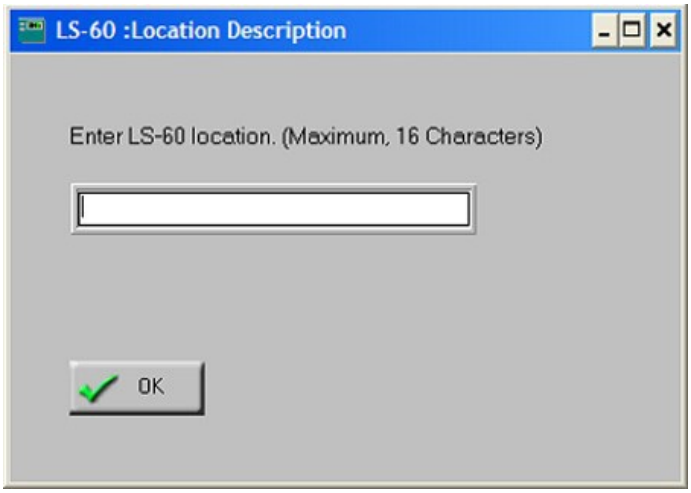


Figure 3-13 Set Location Description

Recipes

Recipes contain the parameters used during sampling, such as sample size, prime amount and alarm thresholds and can be opened, edited and saved to meet different sampling requirements. They are saved with the rcp file extension.

RECIPE

This button opens the Recipe Screen. See Figure 3-14

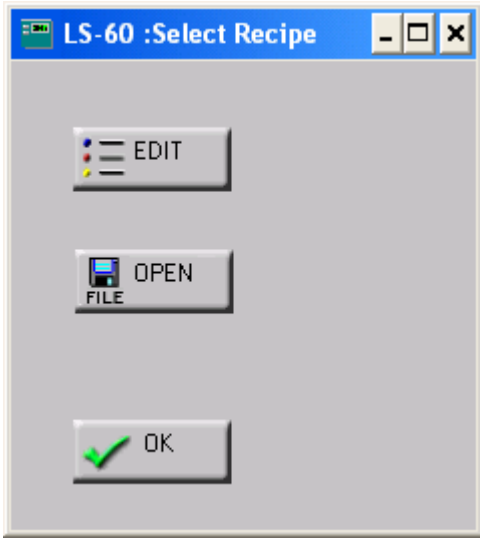


Figure 3-14 Select Recipe Dialog Screen

OPEN

This button shows recipe files saved in the default folder, C:\LS 60. Basic.rcp is the file opened when the software starts and the file to which the software saves the current settings when it shuts down. If the settings contained in this file have not been changed, they are all that is required to effectively sample liquids under most circumstances. It is suggested that, if changes need to be made, they be saved prior to sampling. **OPEN** allows any recipe to be opened, edited and saved as the same filename or as a different filename to make it unique.

The SystemDefault.rcp file is a copy of the basic.rcp and may be opened and resaved as basic.rcp if the original file gets damaged, deleted or needs to be reset to factory defaults. It cannot be resaved as the same filename.

Contact Lighthouse Technical Support for additional information.

Editing Recipes

EDIT

The EDIT button acts on the currently active recipe. Editing a recipe displays the Recipe Dialog screen See Figure 3-15.

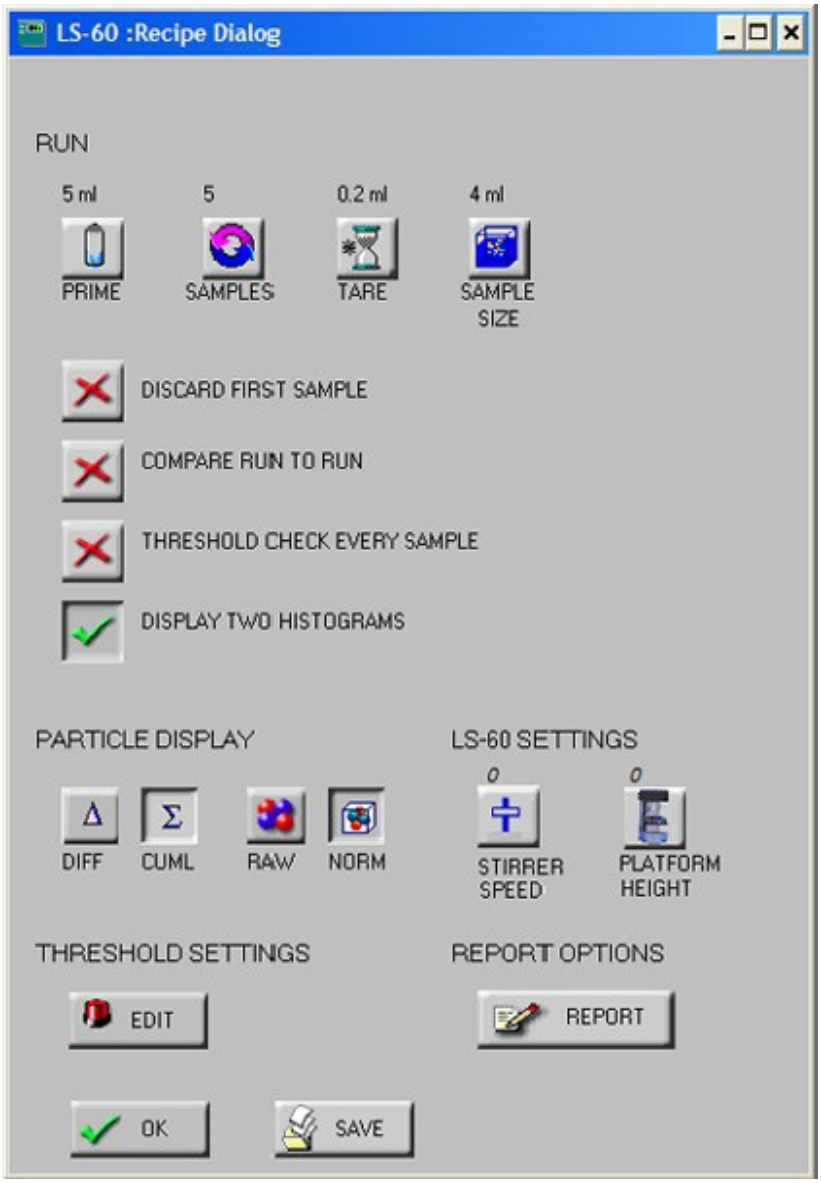


Figure 3-15 Recipe Dialog Screen

PRIME

This allows setting of the quantity of liquid run through the sensor to be discarded. This action clears air bubbles from the sensor and is also intended to purge the sensor of previous sample residues. The default setting is 5 ml. The Prime amount is added to the beginning of each run, during which counting does not take place. It will empty the sensor of the liquid from previous samples.

SAMPLES

The SAMPLES button specifies the number of samples to be taken during the test cycle. The default value is 5.

TARE

The TARE button allows changing default value in the software of 0.2 ml; it should not be changed unless instructed by Lighthouse Technical Support. TARE is added to each syringe cycle, during which counting does not take place. TARE volume is ignored and not counted at the beginning of every syringe of liquid.

SAMPLE SIZE

This button allows changing the volume of the sample in ml from the Basic Recipe value or the most recent saved value. Counting takes place on this volume of liquid.

DISCARD FIRST SAMPLE

The default setting for this is “enabled” so that the first sample gets discarded and not used in the count process. The sensor will be on but the software does not display the first sample’s data or use it in calculations.

COMPARE RUN TO RUN

This enables a Run-to-Run comparison in the data. When the Start button is pressed, the user is prompted to select whether this is a first (baseline) run or not. The baseline run is subtracted from the final run before the thresholds are checked.

THRESHOLD CHECK EVERY SAMPLE

This enables a check of the sensor alarm thresholds after each sample’s counts have been read and processed. When thresholds are exceeded, the alarm icon appears next to the COM status on the MAIN screen.

DISPLAY TWO HISTOGRAMS

This enables the two histogram display in the main LS-60 window. Select the initial histogram to display based on the Particle Display settings entered in the recipe.

LS-60 SETTINGS

STIRRER SPEED

If desired, the user can configure and save a desired stir speed for a specific liquid as a parameter of a recipe. From the Main window, change stir rate, then select the Recipe and Edit buttons and click the Stirrer Speed button at the Recipe Dialog screen. This will display the Get Stirrer Speed dialog box as shown in Figure Figure 3-16.

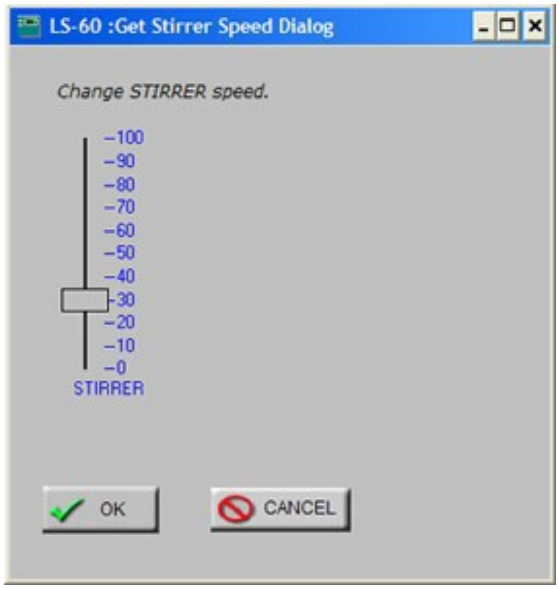


Figure 3-16 Get Stirrer Speed Dialog

Moving the stirrer control changes the LS-60 instrument stirrer speed in real time. Press OK to retain the new speed setting or Cancel to return to the prior speed setting. To save the stirrer speed to the current recipe, press the Save button on the Recipe Dialog box.

When the user opens that particular recipe, the stirrer will begin stirring at the recipe stored speed. The default value is 0.

PLATFORM HEIGHT

If desired, the user can configure and save a desired platform height as a parameter of a recipe. From the Main window change the platform height, then select the Recipe and Edit buttons and click the Platform Height button to display the Get Platform Height dialog box as shown in Figure 3-17.

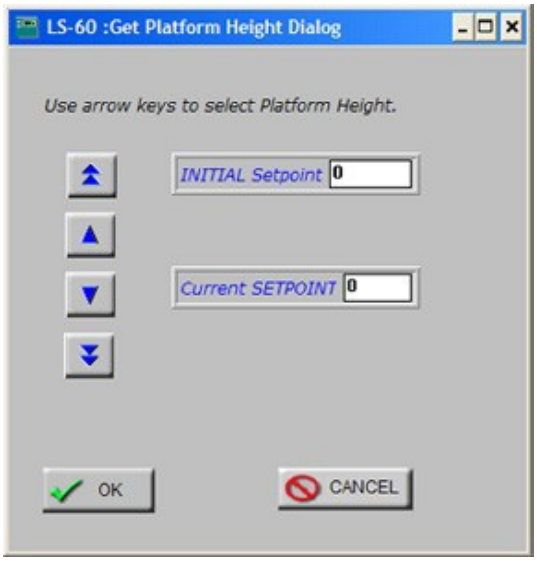


Figure 3-17 Get Platform Height Dialog

The arrow keys adjust the platform as they do in the Main window. The INITIAL Setpoint displays the normalized current setpoint. The Current SETPOINT is updated as the arrow keys are used. Press OK to retain the new setting as the Current SETPOINT or Cancel to return to the INITIAL Setpoint. To save the Setpoint to the current recipe, press the Save button on the Recipe Dialog box.

PARTICLE DISPLAY ICONS

DIFF/CUML

The instrument generates cumulative data. Particle size data for a specific channel contains counts for that size and larger. Selecting differential will only display counts for each particle size and not sum the counts of higher particle sizes. These buttons select between the two.

RAW/NORM

RAW data is particle counts for a specific channel size. NORMalized data is particles per milliliter. These buttons switch between the two.

ALARM THRESHOLD SETTINGS

EDIT

This button allows editing of the Alarm thresholds (Figure 3-18). Enter the particle count the instrument will use for triggering an alarm.

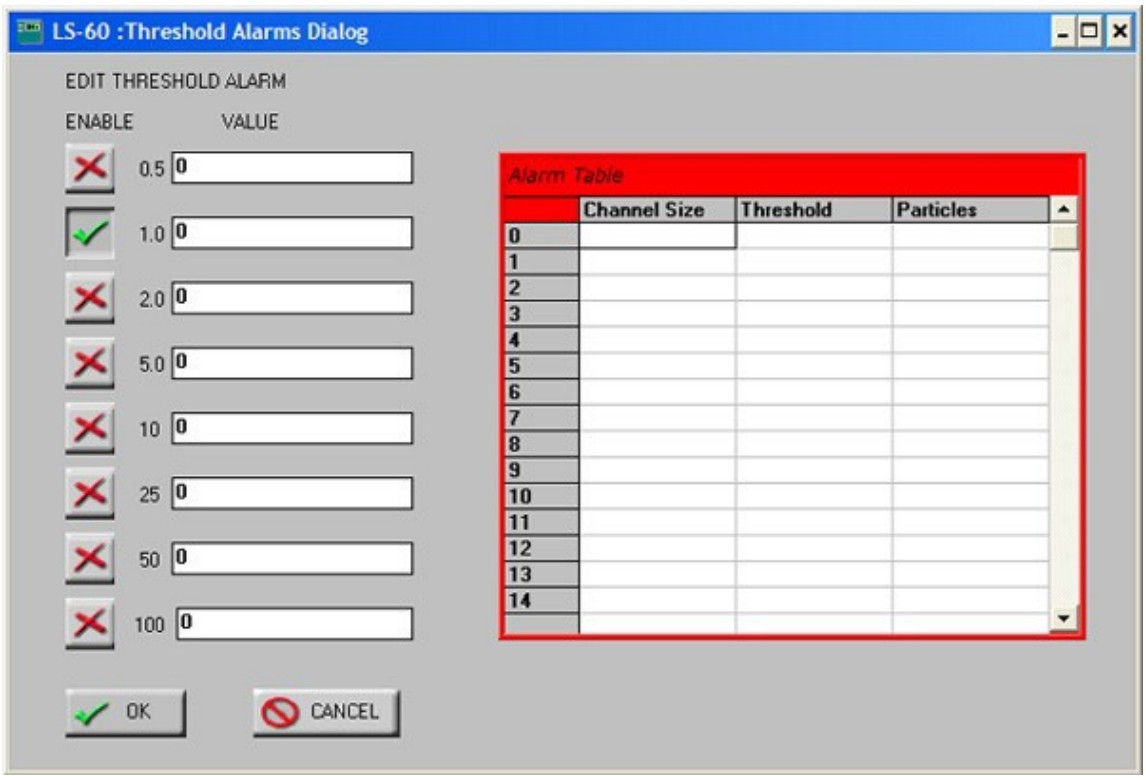


Figure 3-18 Threshold Alarms Dialog Screen

REPORT OPTIONS

REPORT

This button enters the Report Options screen, as illustrated in Figure 3-19.

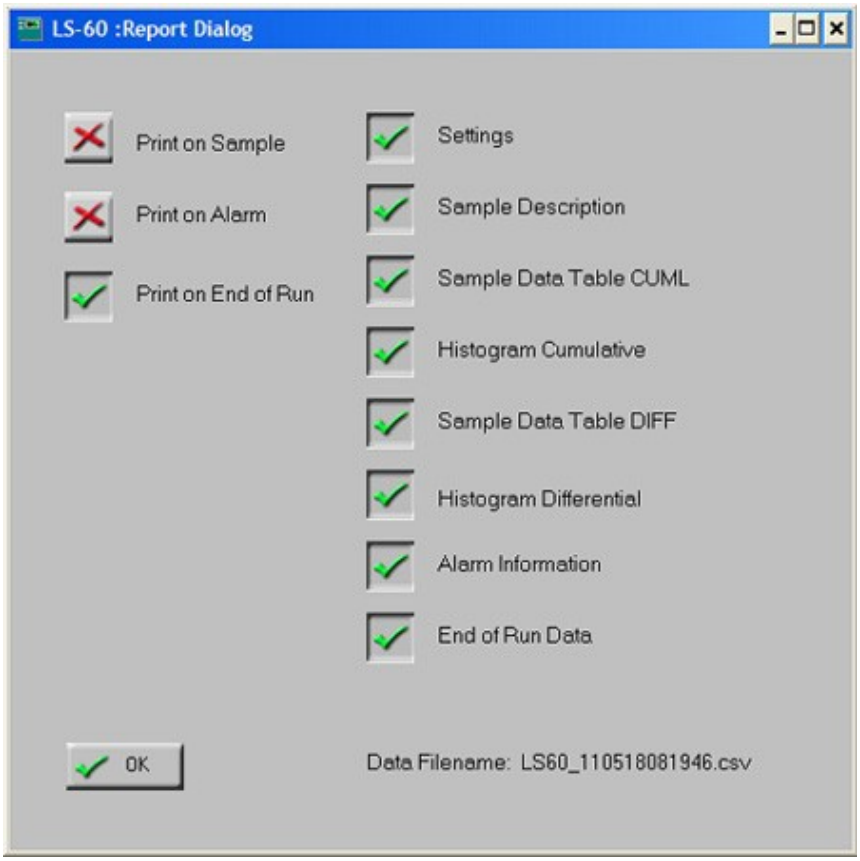


Figure 3-19 Report Dialog Screen

Click the OK button to close the dialog screen and return to the Edit Recipe screen.

SAVE

The SAVE button saves the recipe settings and will prompt for a filename. Basic.rcp file will be overwritten every time the software exits. Saving as a different filename preserves unique settings but will not preserve Basic.rcp.

The recipe can be saved under a different folder, if needed. Doing so, however, will prevent the recipe from being “automatically” seen when the OPEN button is clicked which normally views the LS-60 folder.

Changing the Syringe

WARNING: ***Whenever a change of the syringe size must be performed, the Liquid Sampler must be power-cycled to load the new parameters. If this is not done, accurate data counts cannot be guaranteed.***

To perform this operation, from the **MAIN** screen, click the **SETUP** button, **CHANGE SYRINGE SIZE**, then the **UNLOAD** button.

Syringe Removal

Figure 3-20 illustrates the syringe and valve body parts.

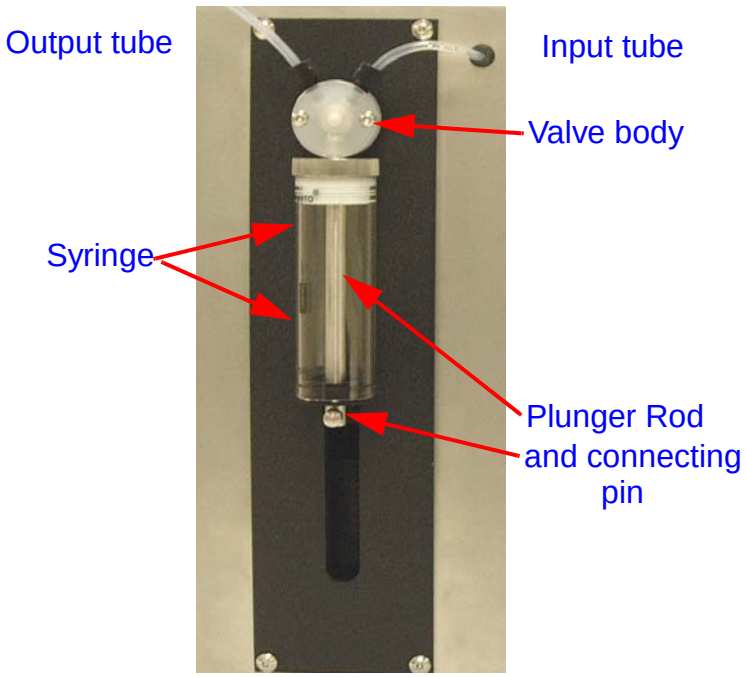


Figure 3-20 Syringe and Pump Detail

The plunger rod actuator arm extends out from the instrument through the vertical slot and is machined to accept the rod end. A threaded hole in the arm accepts the pin.

UNLOAD

This moves the syringe activator to the bottom of the syringe, allowing the syringe to be removed. Removing the bottom pin requires care to prevent damage to the pin's threads. When the pin has been removed from the plunger rod, the syringe body can be unscrewed from the valve. See Figure 3-21.

Figure 3-21 Removing Syringe Mounting Pin

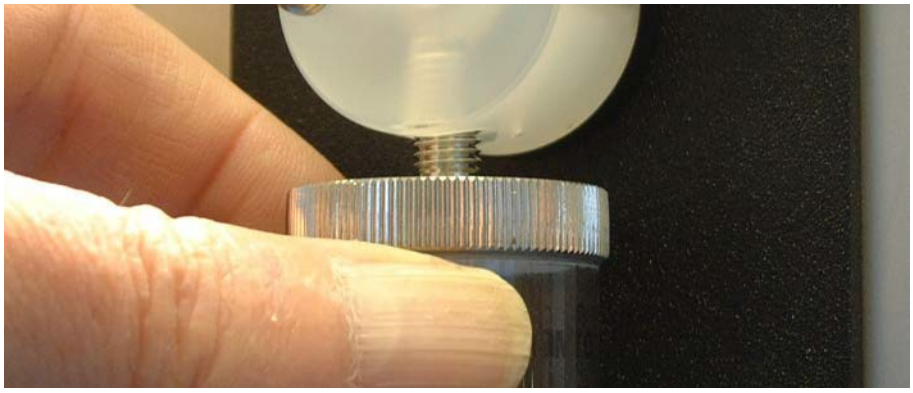


Figure 3-22 Unscrewing Syringe Cylinder

Carefully unscrew the syringe cylinder from the valve body in a counter-clockwise manner as shown in Figure 3-22. Use extreme care while doing this to prevent damage to the valve and the plunger. After removal, carefully store the syringe and plunger together in a container for safe keeping.

WARNING: ***Extreme care must be taken to prevent cross-threading while installing the syringe. Failure to heed this warning may cause irreparable damage to the valve body and void the warranty.***

Syringe Install

Reinstalling the original or installing a replacement syringe requires care to prevent damage to the valve body or syringe. A suggested procedure is to align the plunger rod in the actuator arm cradle as shown in Figure 3-23 & Figure 3-24. This provides an alignment guide so the syringe will be vertical while threading it into the valve body. Threading should be relatively easy so if it feels like the syringe is binding, stop, unscrew and then try again taking extra care. A cross-threaded valve body must be replaced at the factory.

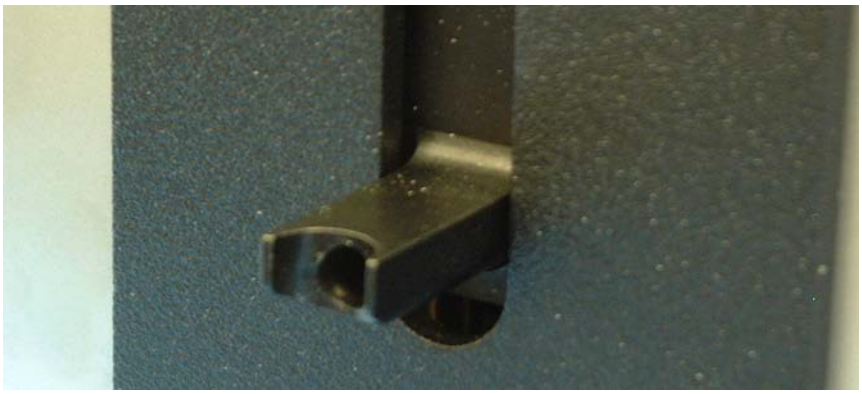


Figure 3-23 Actuator Arm Detail

Figure 3-24 Plunger Rod and Actuator Arm Detail

Installing the replacement syringe requires the same or greater level of care as that required for removal.

Figure 3-25 Reinstalling Plunger Rod Pin

After the syringe has been threaded into the valve body, carefully pull and turn the plunger rod, as needed, to mate to the actuator arm. Carefully install the attachment pin, taking care to not cross-thread it. Hand-tighten the pin and then hand-tighten the syringe. Doing this in this order keeps the rod and syringe in alignment. See Figure 3-25.

LOAD

After the syringe replacement, this button brings the plunger actuator back up to the top position. Once at the top, the syringe will go through the reset sequence of pulling down, then back up to zero itself.

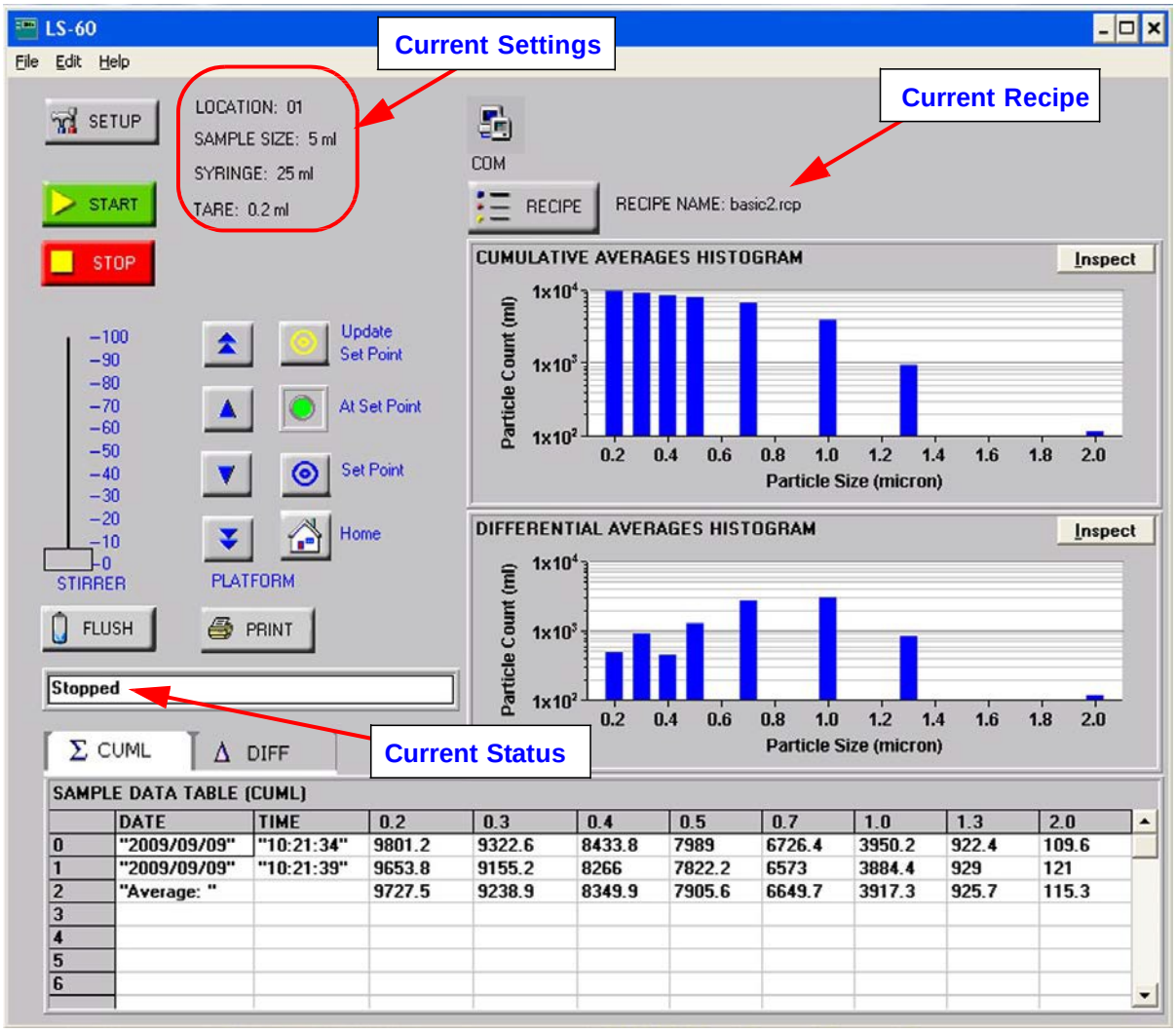
Running a Sample

After the LS-60 is readied for operation with a default recipe set up, prepare a sample to be run. Use the supplied Pyrex glassware or a comparable container. Make sure that the top edge has a light-blocking material added to signal the sensors where the container edge is.

Place the stirrer into the sample and place sample tube into the container. Put the container onto the sample platform. If the end of the tube is not fully submerged in the liquid, raise the platform by using the Gross or Fine platform movement arrows (refer to Figure 3-26).

If the stirrer speed is not set up in the recipe, move the slider to a desired position. Make sure the speed does not create bubbles or excessive turbulence. Click the Start button.

When the sample(s) are completed per recipe, a confirmation box will appear. The data can be reviewed on the screen. See Figure 3-26.



	DATE	TIME	0.2	0.3	0.4	0.5	0.7	1.0	1.3	2.0
0	"2009/09/09"	"10:21:34"	9801.2	9322.6	8433.8	7989	6726.4	3950.2	922.4	109.6
1	"2009/09/09"	"10:21:39"	9653.8	9155.2	8266	7822.2	6573	3884.4	929	121
2	"Average: "		9727.5	9238.9	8349.9	7905.6	6649.7	3917.3	925.7	115.3
3										
4										
5										
6										

Figure 3-26 Software Main screen

Handling of the Sample Tube

To move the end of the sample tube out and allow placement of a beaker on the platform, press the tube outward at the top-most point near the ferrule nut. This will cause to tube to deflect outwardly and allow removal or placement of a beaker. Take care to not bend the tube so as to kink it or it will have to be replaced.

Replacing the Sample Tube

WARNING: ***Care should always be exercised when handling the sample tube. Avoid touching the area of the tube that may come in contact with the sample or the sample will be contaminated.***

Handle the Sample Tube carefully to prevent touching the portion of the tube that will be immersed in the sample. Contaminating the tube will invalidate the counts. See Figure 3-27

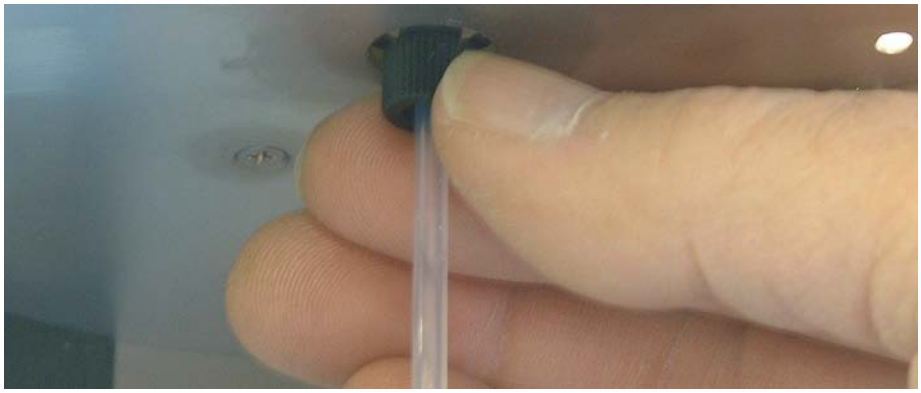


Figure 3-27 Loosening Sample Tube Ferrule Nut

Cleaning the Sensor

Cleaning the sensor is a very delicate operation and should be handled very carefully. Improper use of the cleaning brush can permanently damage the flow cell, requiring replacement of the sensor. Before starting, read the instructions carefully, then read and do. If any problems arise or further clarification is needed, contact Lighthouse Technical Support before proceeding.

Remove Sample Input Tube

Refer to Figure 3-27. If the tube will be reused (which may not be advisable in cases of suspected contamination), carefully unscrew the ferrule nut and firmly pull straight down on the tube. It may require a slight side-to-side motion to dislodge it from the fitting.

Cleaning Brush and Solution

Dip the cleaning brush into the Micro 90 cleaning solution provided in the unit's ship kit. Carefully align the bristle tip and handle of the brush so they are vertical and centered on the opening to the bottom of the sensor. Slowly insert the brush into the sensor opening until resistance is felt.

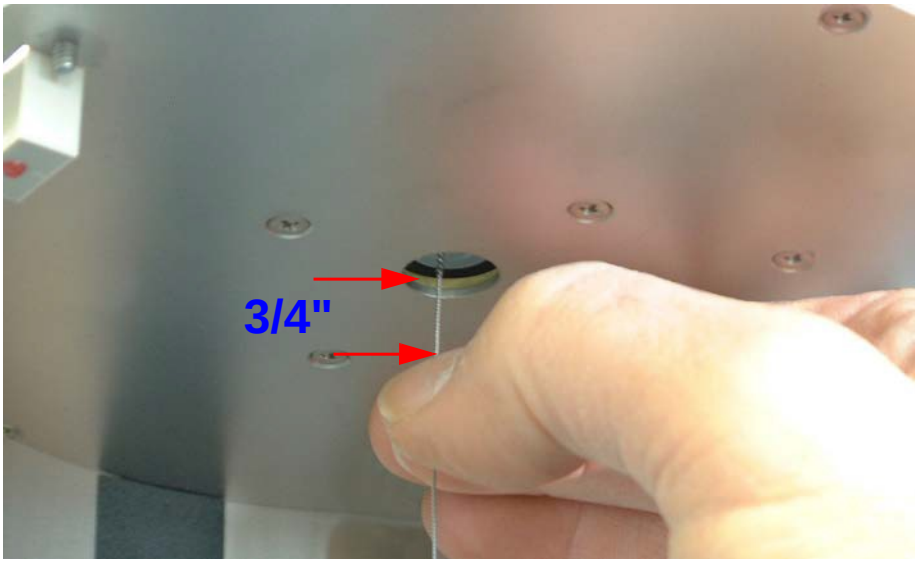


Figure 3-28 Correct Grip on Cleaning Brush

Refer to Figure 3-28 and, with just the tip of the brush inserted, move your grip three-quarters of an inch down the brush shaft and continue to push the brush into the sensor - do not let go of the brush. This distance (3/4”) will prevent the brush from exiting the other end of the flow cell and allowing the brush shaft to contact the flow cell wall, potentially scratching the flow cell. If this happens, damage to cell may void the sensor warranty and require the Sampler to be returned to the factory for repair.

Move the brush in and out three to five times, then reinstall the sample tube making sure the ferrule nut is hand-tightened to very snug.

Follow any brush cleaning with at least one Flush cycle, preferably two. Check the Clean Sensor screen and verify that the value is below 2000. If not, repeat the process once.

If the cleaning does not appear to be changing the sensor value after two cleaning cycles and it is evident the LS-60 may have been exposed to dirty sample liquid, try a solution of 20% Micro90 and 80% DI water in a small beaker. Allow the LS-60 to pull that liquid into the sensor, leave the solution in the sample chamber overnight (12hours) then flush with clean DI water. Recheck the results.

If the preceding cleaning steps do not appear to be changing the sensor value, contact Lighthouse Technical Support.

A Limited Warranty

Limitation Of Warranties:

A. Lighthouse Worldwide Solutions (LWS) warrants that all equipment shall be free from defects in material and workmanship under normal use for a period of two years from date of shipment to Buyer except that LWS does not warrant that operation of the software will be completely uninterrupted or error free or that all program errors will be corrected. Buyer shall be responsible for determining that the equipment is suitable for Buyer's use and that such use complies with any applicable local, state, or federal law. Provided that Buyer notifies LWS in writing of any claimed defect in the equipment immediately upon discovery and any such equipment is returned to the original shipping point, transportation charges prepaid, within two years from date of shipment to Buyer and upon examination LWS determines to its satisfaction that such equipment is defective in material or workmanship, i.e. contains a defect arising out of the manufacture of the equipment and not a defect caused by other circumstances, including, but not limited to accident, misuse, unforeseeable use, neglect, alteration, improper installation, improper adjustment, improper repair, or improper testing, LWS shall, at its option, repair or replace the equipment, shipment to Buyer prepaid. LWS shall have reasonable time to make such repairs or to replace such equipment. Any repair or replacement of equipment shall not extend the period of warranty. If the Instrument is modified or in any way altered without the explicit written consent of LWS then the warranty is null and void. This warranty is limited to a period of two years, except as noted below, without regard to whether any claimed defects were discoverable or latent on the date of shipment. The length of warranty for pumps in hand held Liquid Samplers is one (1) year. Batteries and accessories with all products are warranted for one (1) year. Fuses and purge filters carry no warranty. If a third party battery is used in the product, the product warranty is null and void. If the battery is charged by a third party battery charger the battery warranty is null and void.

B. If Buyer shall fail to pay when due any portion of the purchase price or any other payment required from Buyer to LWS under this contract or otherwise, all warranties and remedies granted under this Section may, at LWS's option, be terminated.

C. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER REPRESENTATIONS, WARRANTIES AND COVENANTS, EXPRESS OR IMPLIED WITH RESPECT TO THE EQUIPMENT AND ANY DEFECTS THEREIN OF ANY NATURE WHATEVER, INCLUDING AND WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. LWS SHALL NOT BE LIABLE FOR, AND BUYER ASSUMES ALL RISK OF, ANY ADVICE OR FAILURE TO PROVIDE ADVICE BY LWS TO BUYER REGARDING THE EQUIPMENT OR BUYERS USE OF THE SAME. UNDER NO CIRCUMSTANCES SHALL LWS BE LIABLE TO BUYER UNDER ANY TORT, NEGLIGENCE, STRICT LIABILITY, OR PRODUCT LIABILITY CLAIM AND BUYER AGREES TO WAIVE SUCH CLAIMS. LWS's SOLE AND EXCLUSIVE LIABILITY AND BUYERS SOLE AND EXCLUSIVE REMEDY, FOR ANY NONCONFORMITY OR DEFECT IN THE PRODUCTS OR ANYTHING DONE IN CONNECTION WITH THIS CONTRACT, IN TORT, (INCLUDING NEGLIGENCE), CONTRACT, OR OTHERWISE, SHALL BE AS SET FORTH IN THE SUBSECTION A HEREOF AS LIMITED BY SUBSECTION B HEREOF. THIS EXCLUSIVE REMEDY SHALL NOT HAVE FAILED OF ITS ESSENTIAL PURPOSE (AS THAT TERM IS USED IN THE UNIFORM COMMERCIAL CODE) PROVIDED THAT THE SELLER REMAINS WILLING TO REPAIR OR REPLACE DEFECTIVE EQUIPMENT (AS DEFINED IN SUBSECTION A) WITH A COMMERCIALLY REASONABLE TIME AFTER RECEIVING SUCH EQUIPMENT. BUYER SPECIFICALLY ACKNOWLEDGES THAT SELLER'S PRICE FOR THE EQUIPMENT IS BASED UPON THE LIMITATIONS OF LWS'S LIABILITY AS SET FORTH IN THIS CONTRACT.

Warranty Of Repairs After Initial Two (2) Year Warranty:

A. Upon expiration of the initial two-year warranty, all parts and repairs completed by an authorized Lighthouse repair technician are subject to a six (6) month warranty.

B. Other than the above, LWS makes no warranty of any kind, expressed or implied, except that the products manufactured and sold by LWS shall be free from defects in materials and workmanship and shall conform to LWS's specifications; Buyer assumes all risk and liability resulting from use of the products whether used singly or in combination with other products. If instrument is modified or in any way altered without the explicit written consent of LWS, then the warranty is null and void.

C. WARRANTY REPAIRS SHALL BE COMPLETED AT THE FACTORY, BY AN AUTHORIZED SERVICE LOCATION, BY AN AUTHORIZED SERVICE TECHNICIAN, OR ON SITE AT BUYER'S FACILITY BY A LIGHTHOUSE AUTHORIZED EMPLOYEE. BUYER PAYS FREIGHT TO FACTORY; SELLER WILL PAY STANDARD RETURN FREIGHT DURING THE WARRANTY PERIOD. BUYER MAY SELECT A FASTER METHOD OF SHIPMENT AT ITS OWN EXPENSE.

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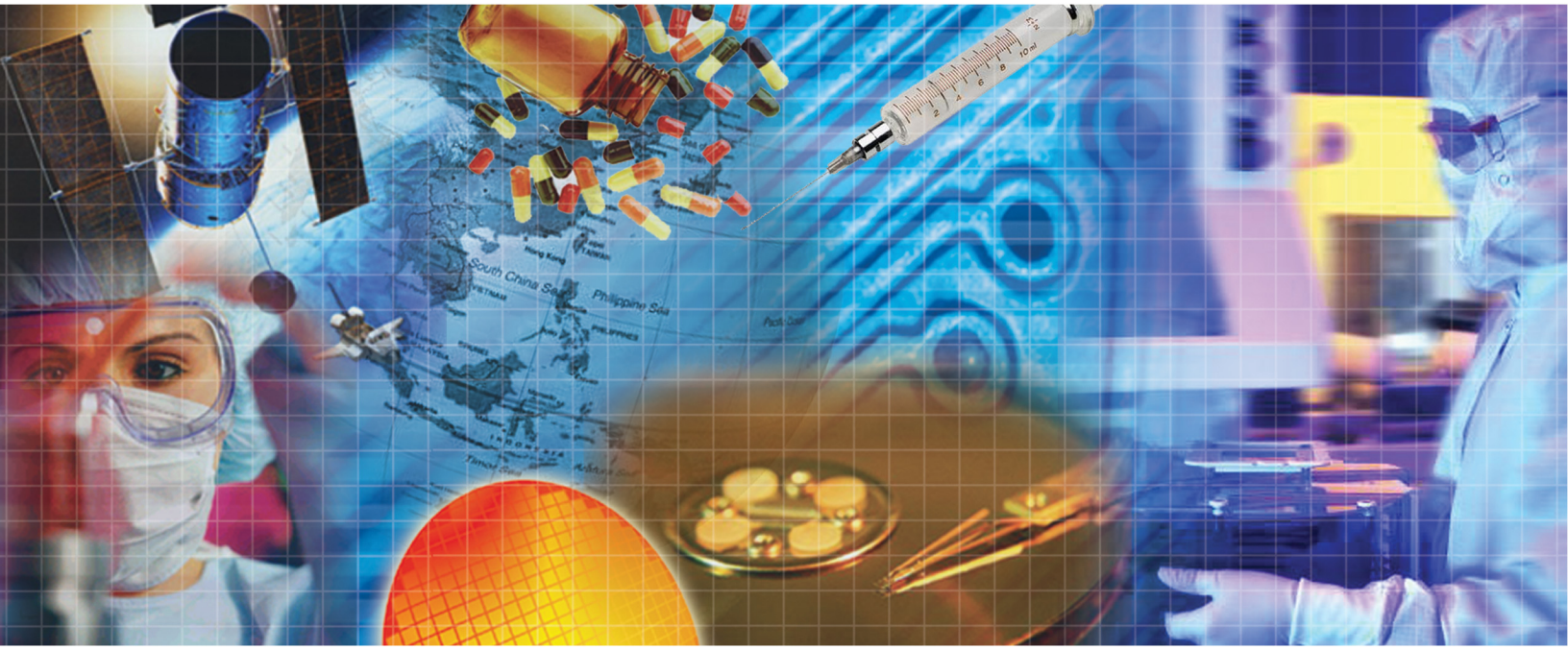

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