



Lysor™ Operations Manual

List Number 05C73-01

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Foreword

The Abbott LCx Lysor is a component of the Abbott LCx Probe System.

The LCx Lysor is backed by dedicated professionals with expertise in engineering, training, and technical information. As a valued customer, we will teach you how to operate, maintain, and troubleshoot your system when you attend our PACE accredited training program at our Dallas, Texas facility.

This manual should serve as a reference to all aspects of instrument operation. Please familiarize yourself with its contents. Technical assistance from our Customer Support Center staff is also available. We look forward to serving your needs.

Customer Support Center (CSC)

Abbott Laboratories Diagnostics Division

United States: 1-800-527-1869

Canada: English 1-800-387-8378
French 1-800-465-2675

International: Call your local Customer Service Representative.

Intended Use

The Abbott LCx Lysor is intended for use as an accessory of the Abbott LCx Probe System, for lysing of microorganisms.

Proprietary Statement

Entire contents are copyrighted© 1995 by Abbott Laboratories Diagnostics Division. All rights are reserved.

All operating instructions must be followed. In no event shall Abbott be responsible for failures, errors, or other liabilities resulting from customers' noncompliance with the procedures and precautions outlined herein.

No part of this document may be reproduced, stored, or transmitted in any form or by any means electronic, mechanical, photocopied, recorded, or otherwise without the prior written permission of Abbott Laboratories.

Pictorial Disclaimer

Illustrations contained in this manual are for informational purposes only. They are not to be used for clinical or maintenance evaluations.

Abbott Instrument Warranty (U.S. customers only)

ABBOTT LABORATORIES ("ABBOTT") WARRANTS THE LCx LYSOR ("INSTRUMENT") SOLD BY THE ABBOTT DIAGNOSTICS DIVISION TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS DURING NORMAL USE BY THE ORIGINAL PURCHASER. THIS WARRANTY SHALL CONTINUE FOR A PERIOD OF NINETY (90) DAYS FROM THE DATE OF SHIPMENT TO THE ORIGINAL PURCHASER, OR UNTIL TITLE IS TRANSFERRED FROM THE ORIGINAL PURCHASER, WHICHEVER OCCURS FIRST (THE "WARRANTY PERIOD").

IF ANY DEFECTS OCCUR, CONTACT **ABBOTT CUSTOMER SUPPORT** IMMEDIATELY, AND BE PREPARED TO FURNISH PERTINENT DETAILS CONCERNING THE DEFECT, THE MODEL NUMBER, AND THE SERIAL NUMBER.

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Trademark Statement

LCx[®] and Lysor[™] are Trademarks of Abbott Laboratories.

NOTES

Use and Function

The LCx[®] Lysor[™] (see [Figure 1](#)) provides a means of lysing microorganisms in tubes used for in vitro diagnostic procedures. The LCx Lysor is an electromechanical device which can lyse up to 20 samples at one time.

The key components of the LCx Lysor are a piezoelectric transducer, an electrical power supply, a controller/timer, and a sample plate (see [Figure 2](#)). The transducer operates at frequencies above the audible range (ultrasonic). When supplied with power, the transducer generates mechanical vibrations which are transmitted to the sample plate, and ultimately to the samples. The interaction of the mechanical waves from the transducer with the sample plate induces plate waves. The LCx Lysor takes advantage of the plate waves to enhance the lysing efficiency of microorganisms.

The sample plate (see [Figure 3](#)) contains threaded holes that are designed to anchor the specimen tubes during LCx Lysor operation. The power supply is designed to deliver the same amount of energy to each specimen tube.

The LCx Lysor operations are controlled by a control panel containing switches and indicators (see [Figure 6](#)). All lysing parameters are preset.

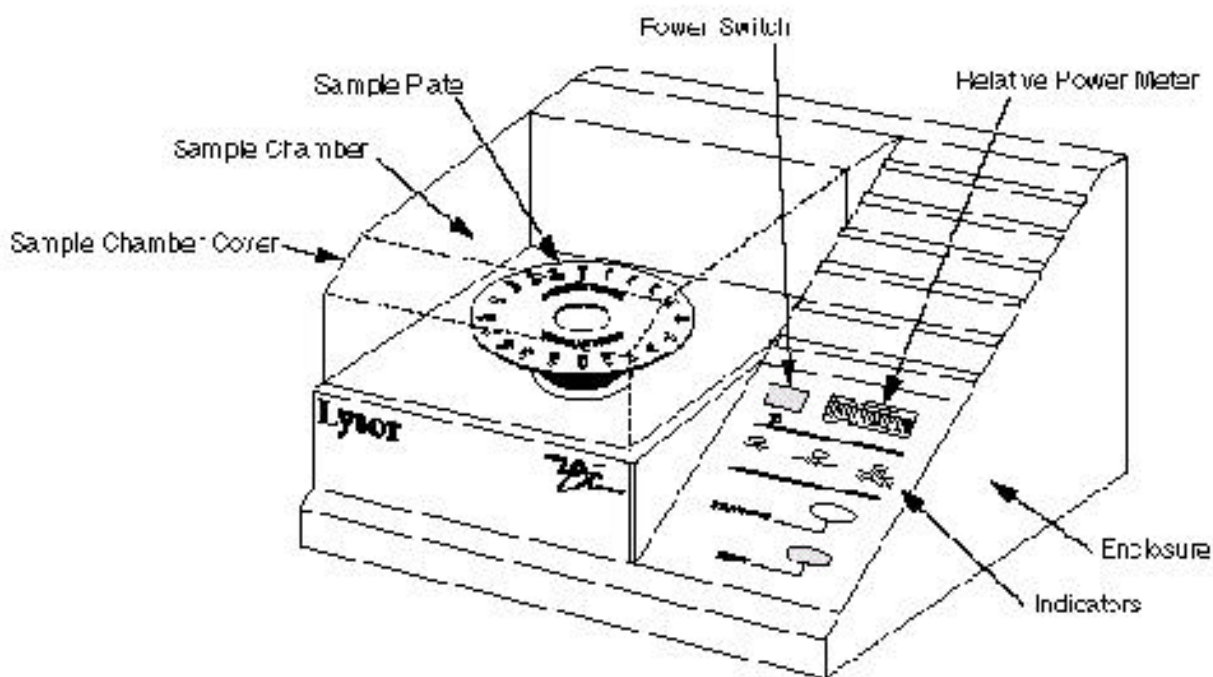


Figure 1: LCx Lysor

Installation Procedure

1. Remove the LCx Lysor, list number 03C54-01, from the shipping carton. Verify there are no external damages due to shipping.



CAUTION: Do not install the Lysor near radiators or heating vents. Ensure that the air exhaust at the rear of the Lysor is not obstructed.

2. Allow the Lysor to come to room temperature.



WARNING: The voltage setting on the LCx Lysor must be compatible with your lab's power supply. Failure to set the Lysor to the proper voltage may result in inadequate lysing, Lysor failure, or fire.

3. Verify that the Lysor is set to the correct voltage. The voltage setting appears in the window above the fuse holder tab located at the rear of the LCx Lysor (see **Figure 4**). Voltage setting options are 100, 115, or 230. If the voltage setting is correct, proceed to step 4 below. If the voltage setting is incorrect:
 - a. Verify that the power is off and the Lysor is unplugged.
 - b. Locate the fuse drawer which is at the rear of the LCx Lysor, directly above the power receptacle. (See **Figure 4**.)
 - c. Remove the fuse drawer by placing the blade of a flat-head screwdriver below the fuse holder tab. Holding the screwdriver in a nearly vertical position, gently push up on the tab with the screwdriver. The fuse drawer will pop out of the LCx Lysor.
 - d. Gently slide the gray fuse holder out of the drawer (see **Figure 5**).
 - e. Locate the voltage setting numbers printed on the bottom of the fuse holder (100, 115, 230).
 - f. Rotate the entire gray fuse holder until the correct voltage setting number will be visible through the window in the fuse drawer when the fuse holder is reinserted into the fuse drawer.
 - g. Push the fuse holder back into the drawer until a click is heard.
 - h. Verify the correct voltage setting shows through the window. Repeat Steps d through h if the correct voltage setting is not visible.
 - i. Reinsert the fuse drawer into the LCx Lysor. Push until a click is heard.
4. Plug the power cord into a 3-wire grounded electrical outlet. If the Lysor power switch is illuminated, press the power switch (see **Figure 1**) to OFF.



WARNING: Do not use three-to-two plug adapters.

5. Close the sample chamber cover, (see **Figure 1**).

6. Press the power switch to ON. Verify that:
 - The POWER switch illuminates.
 - Air is escaping from the exhaust vent located at the rear of the Lysor indicating that the fan is operating.
 - The ERROR, PROCESSING, and PROCESS COMPLETE lights are not illuminated.
 - No alarm is heard.
 - The RELATIVE POWER meter needle indicates less than 5% of full scale.
7. Press the START/STOP switch. Verify that:
 - The PROCESSING indicator light blinks.
 - The ERROR and PROCESS COMPLETE indicator lights are not illuminated.
 - No alarm is heard.
 - The RELATIVE POWER meter needle indicates between 5% and 30% of full scale.
8. Press the START/STOP switch. Verify that:
 - The PROCESSING indicator light is not illuminated.
 - The ERROR indicator light illuminates.
 - A warning alarm is heard every 10 – 15 seconds.
 - The RELATIVE POWER meter needle indicates less than 5% of full scale.
9. Press the RESET switch. Verify that:
 - The ERROR indicator light turns off.
 - The warning alarm stops.
10. Press the START/STOP switch. Verify the conditions as in Step 7.
11. Open the sample chamber cover. Verify the conditions as in Step 8.
12. Press the RESET switch. Verify the conditions as in Step 9.
13. Press the POWER switch to OFF.
14. Contact LCx CSC if any of the above tests fail.

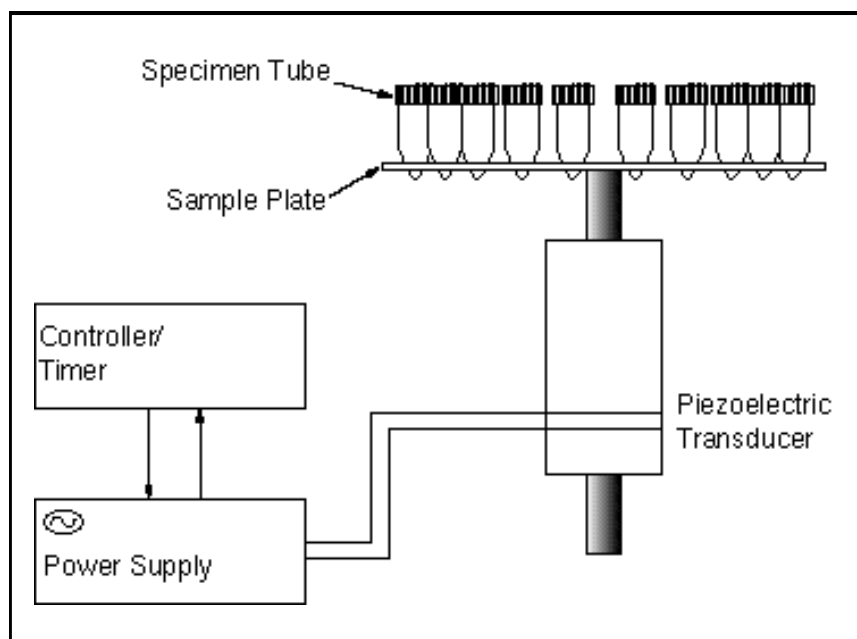


Figure 2: Key Components of the LCx Lysor

Relative Power Meter Verification/Glass Bead Visual Verification

For this verification you will need 20 unused Respiratory Specimen Tubes, each tube containing 500 μL of liquid. Since the tubes are supplied with 900 μL , remove 400 μL of liquid from each of the 20 tubes.

1. Press the POWER switch to ON.
2. Open the sample chamber cover.
3. Load the sample plate with two unused specimen tubes according to **Table 1: Tube Placement Guide**. The specimen tubes are secured into the threaded holes of the sample plate by pushing down on the tubes while turning them CLOCKWISE one-quarter to one full turn. Verify that the tubes are secured by pulling lightly upwards. Resecure tubes if necessary.
4. Close the sample chamber cover.
5. Press the START/STOP switch and record the reading from the RELATIVE POWER meter during the ON portion of five cycles.

NOTE: The RELATIVE POWER meter's readings may be higher at the beginning of the ON cycle than the ranges in **Table 2: Expected RELATIVE POWER Meter Readings**. The readings should stabilize to the values specified in **Table 2** after two cycles and within two seconds of the start of each ON cycle.

NOTE: In each of the tubes, bead activity should be noted above the sample plate during the ON portion of 5 cycles.

6. Press the START/STOP switch followed by pressing the RESET switch.
7. Repeat **Steps 2** through 6 with 6 and 20 unused specimen tubes.
8. Refer to **Table 2** for the expected RELATIVE POWER meter readings.
9. Press the POWER switch to OFF.
10. Remove the tubes from the sample plate.
11. Contact **LCx CSC** if any of the readings fall outside of the expected ranges or if bead activity is not noted above the sample plate in each of the tubes.

Timing Verification

Verify that the lysing and resting periods of each cycle are correct. Also ensure that the run has the correct number of cycles.

- Close the sample chamber cover.
 - Press the START/STOP switch and immediately start timing the run.
 - Verify during several cycles that the lysing period of each cycle is 10 ± 1 seconds. The lysing period of each cycle is indicated by an increase of the power reading on the RELATIVE POWER meter.
 - Verify during several cycles that the resting period of each cycle is 35 ± 1 seconds. The RELATIVE POWER meter needle should indicate less than 5% of full scale
 - Verify that there are 14 cycles in the run, after which the PROCESS COMPLETE indicator illuminates and activates an audible alarm which is heard every 10 – 15 seconds.
12. Press the power switch to OFF.

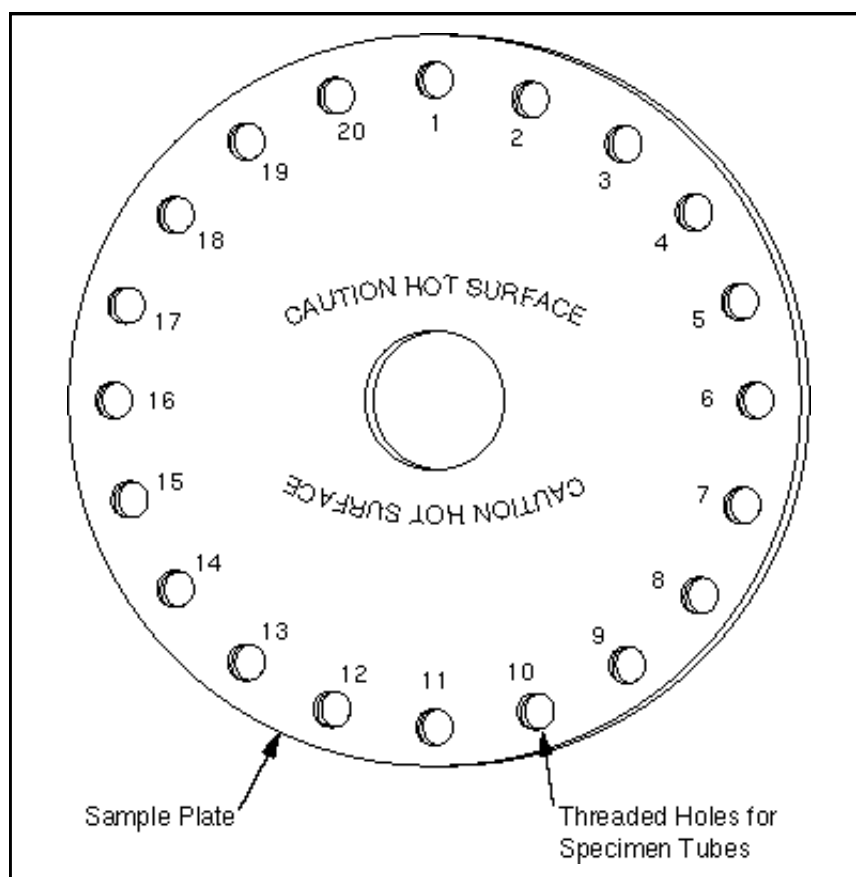


Figure 3: LCx Lysor Sample Plate

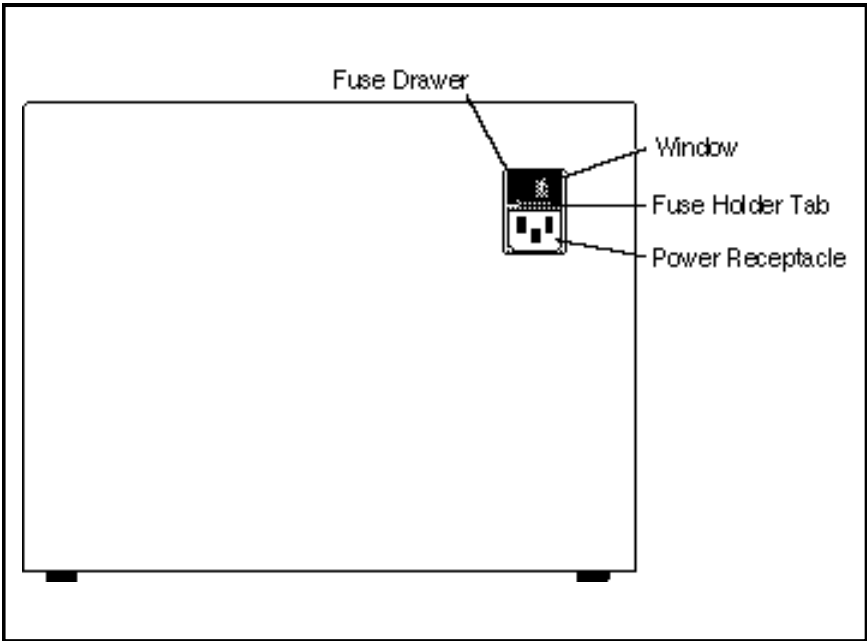


Figure 4: Rear view of the LCx Lysor

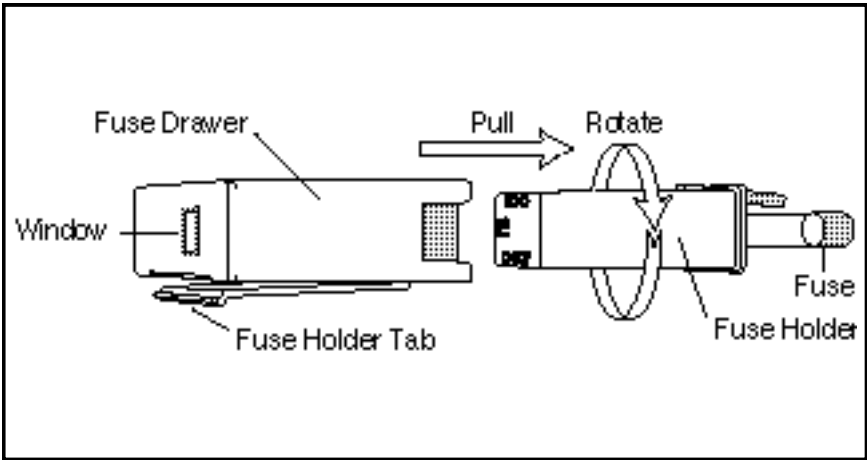


Figure 5: LCx Fuse Assembly

Principles of Operation

Switches and Indicators

The LCx Lysor is equipped with the following switches and indicators (see Figure 6).

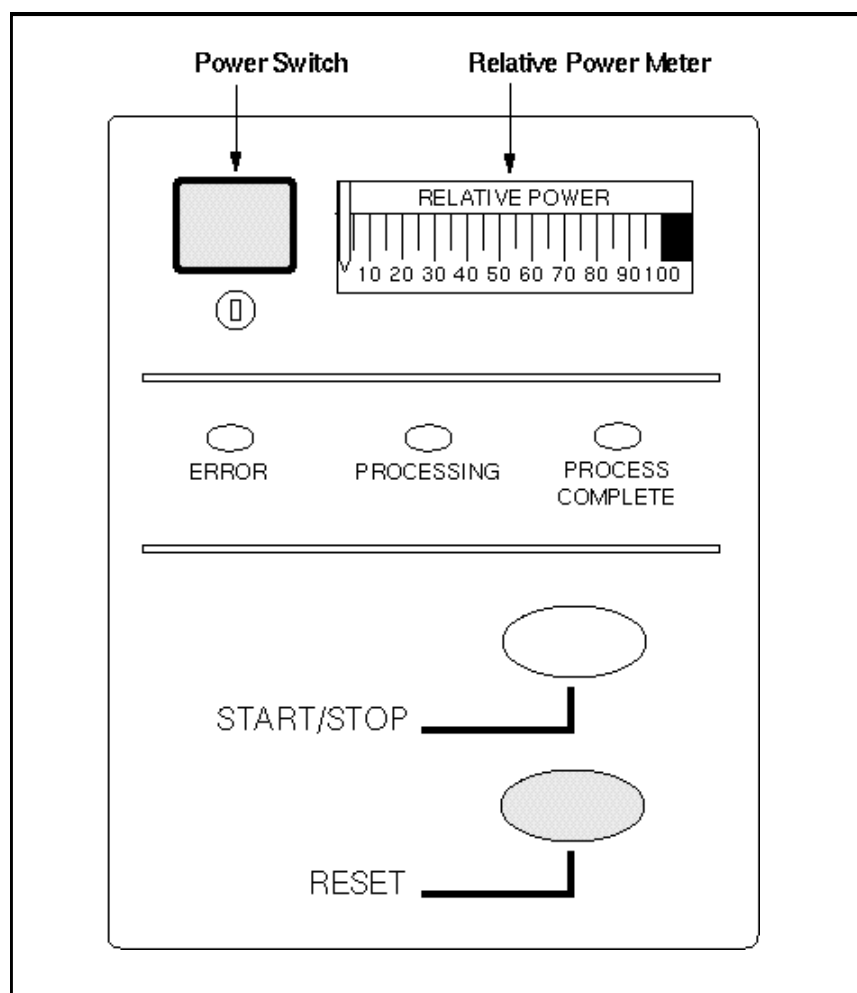


Figure 6: Switches and Indicators

POWER Switch

Turns the LCx Lysor ON or OFF, and illuminates when in the ON position. Turning the POWER switch OFF cancels operation and resets the timer to zero.

START/STOP Switch

Activates the piezoelectric transducer and begins operation. A second press of this switch during a run aborts the process and activates the ERROR indicator.

RESET Switch

Allows for a restart after any of the following events:

- The sample chamber cover was opened during a run.
- The START/STOP switch was pressed during a run.
- An ERROR was detected during a run.

PROCESSING Indicator

Blinks when a run is in progress.

RELATIVE POWER Meter

Indicates that relative power (0 – 100%) is being supplied to the sample plate. The meter reading is a function of the number of tubes being processed, and should read greater than 5% during the lysing period of each cycle.

ERROR Indicator

Indicates the occurrence of errors by illuminating and by activating an audible warning alarm every 10 – 15 seconds. Possible error conditions include:

- The sample chamber cover was opened during the run.
- The START/STOP switch was depressed during the run.
- Incorrect timing.
- No power was delivered to the sample plate.

PROCESS COMPLETE Indicator

Indicates the completion of a successful run by illuminating and activating an audible alarm which is heard every 10 – 15 seconds. The sound produced by the PROCESS COMPLETE indicator is different from the one produced by the ERROR indicator.

Electrical Shock Hazard



WARNING: To avoid electrical shock:

- Use a properly grounded electrical outlet of correct voltage and current handling capacity.
- Disconnect the LCx Lysor from the power supply prior to performing service or maintenance.
- High voltage is present in the LCx Lysor power supply. Do not attempt to open the enclosure (see **Figure 1**) or operate with the enclosure open.
- Do not spill liquid into the LCx Lysor. Do not immerse the LCx Lysor in liquid.

Personal Injury Hazard



WARNING: To avoid personal injury:

- Do not touch the specimen tubes immediately after the run is complete because they will be hot. Allow at least five minutes for cooling after the run is completed.
- The LCx Lysor produces ultrasonic frequencies. If irritation is experienced, wear protective hearing gear.
- Do not operate in the presence of flammable or combustible materials; fire or explosion may result. This device contains components which may ignite such materials.

Biohazard



WARNING: Potential Biohazard.

Biosafety Level 2¹ or other appropriate biosafety practices^{2, 3, 4}, should be used for materials that contain or are suspected of containing infectious agents. These practices include, but are not limited to the following: wear gloves when handling specimens or reagents, do not pipette by mouth, and do not eat, drink, smoke, apply cosmetics, or handle contact lenses in areas where these materials are handled.

NOTES

Characteristics and Specifications

Mechanical Characteristics

Dimensions	12.75 in D X 12 in W X 8.5 in H (32.4 cm D X 30.5 cm W X 21.6 cm H)
Weight	18.5 lbs (8.4 kg)

Electrical Requirements

Operating Voltage	100, 120, and 230 V
Operating Line Frequency	50 or 60 Hz
Power Consumption	230 VA
Line Current Draw	2 Amps
Line Fuse	3 Amps (100, 120 V) 1.5 Amps (230 V)
Maximum Output Power	130 Watts
Maximum Heat Output	444 Btu/hour

Environmental Requirements

Operating Temperature	15° – 30°C
Humidity	15 – 85% non-condensing
Operating Altitude (Maximum)	8000 feet (2438 meters) above sea level

NOTES

Operating Instructions



WARNING: Potential Biohazard.



Biosafety Level 2¹ or other appropriate biosafety practices^{2, 3, 4}, should be used for materials that contain or are suspected of containing infectious agents. These practices include, but are not limited to the following: wear gloves when handling specimens or reagents, do not pipette by mouth, and do not eat, drink, smoke, apply cosmetics, or handle contact lenses in areas where these materials are handled.



WARNING: Failure to use the specimen tubes specified in your assay-specific package insert may result in melting of tubes or insufficient transfer of ultrasonic energy to the samples.



CAUTION:

- Ensure that each specimen tube contains at least 500 μ L of Liquid.
 - Ensure that the specimen tubes are securely capped
1. Press the POWER switch to ON.
 2. Open the sample chamber cover.
 3. Load the sample plate with specimen tubes according to **Table 1**: Tube Placement Guide. The sample plate is numbered to assist in symmetrical loading (see **Figure 3**). The specimen tubes are anchored into the threaded holes of the sample plate by pushing down on the tubes while turning them **CLOCKWISE** one-quarter to one full turn.

NOTE: Verify that the specimen tubes are secured onto the sample plate by gently pulling the tubes upward. The tubes should not pull out easily. Tighten if necessary.

The *minimum number of specimen tubes that can be run is two*. In case only one sample tube is to be lysed, balance the sample plate with an unused specimen tube. Prepare by removing 400 μ L of liquid from unused specimen tube.

4. Close the sample chamber cover.

5. Press the START/STOP switch. Verify that:
 - The PROCESSING indicator light blinks.
 - The ERROR indicator does not illuminate and the warning alarm is not heard.
 - Glass beads are vibrating vigorously during the lysing period of each cycle.
 - The RELATIVE POWER meter is between 5% and 100% of full scale, depending on the number of specimen tubes being processed, during the lysing period of each cycle.

NOTE: Do not open the sample chamber cover during the run.

6. Wait for at least five minutes before opening the sample chamber cover after completion of the run, which is indicated by illumination of the PROCESS COMPLETE indicator and by an audible alarm.



WARNING: Hot Surfaces. Specimen tubes will be hot immediately after run completion.

7. Unload the sample plate by turning the specimen tubes COUNTERCLOCKWISE and lifting.
8. Press the POWER switch to OFF.

Table 1: Tube Placement Guide. Positions are marked on the sample plate shown in **Figure 3**.

Number of Tubes	Position of Tubes on the Sample Plate
2	1, 11
3	1, 7, 15
4	1, 6, 11, 16
5	1, 5, 9, 13, 17
6	1, 4, 7, 11, 14, 17
7	1, 4, 7, 10, 13, 16, 18
8	1, 3, 6, 8, 11, 13, 16, 18
9	1, 3, 5, 8, 10, 12, 14, 16, 18
10	1, 3, 5, 7, 9, 11, 13, 15, 17, 19
11	1, 2, 3, 5, 7, 9, 11, 13, 15, 17, 19
12	1, 2, 3, 5, 7, 9, 11, 12, 13, 15, 17, 19
13	1, 2, 3, 5, 7, 8, 9, 11, 12, 13, 15, 17, 19
14	1, 2, 3, 5, 7, 8, 9, 11, 12, 13, 15, 17, 18, 19
15	1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 15, 17, 18, 19
16	1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17, 18, 19
17	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19
18	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19
19	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
20	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

NOTES

Calibration must not be performed by the user. For further information contact your **LCx Customer Support Center (CSC)**.

NOTES



WARNING: The LCx Lysor must be decontaminated prior to shipment or transfer from the laboratory.

Monthly Maintenance

Relative Power Meter Verification/Glass Bead Visual Verification

For this verification you will need 20 unused Respiratory Specimen Tubes, each tube containing 500 μL of liquid. Since the tubes are supplied with 900 μL , remove 400 μL of liquid from each of the 20 tubes.

1. Press the POWER switch to ON.
2. Open the sample chamber cover.
3. Load the sample plate with two unused specimen tubes according to **Table 1: Tube Placement Guide**. The specimen tubes are secured into the threaded holes of the sample plate by pushing down on the tubes while turning them **CLOCKWISE** one-quarter to one full turn. Verify that the tubes are secured by pulling lightly upwards. Resecure tubes if necessary.
4. Close the sample chamber cover.
5. Press the START/STOP switch and record the reading from the **RELATIVE POWER** meter during the ON portion of five cycles.

NOTE: The **RELATIVE POWER** meter's reading may be higher at the beginning of the ON cycle than the ranges in **Table 2: Expected RELATIVE POWER Meter Readings**. The readings should stabilize to the values specified in **Table 2** after two cycles and within two seconds of the start of each ON cycle.

NOTE: In each of the tubes, bead activity should be noted above the sample plate during the ON portion of five cycles.

6. Press the START/STOP switch followed by pressing the RESET switch.
7. Repeat Steps 2 through 6 with 6 and 20 unused specimen tubes.

- 8. Refer to Table 2 for the expected RELATIVE POWER meter readings.
- 9. Press the POWER switch to OFF.
- 10. Remove the tubes from the sample plate.
- 11. Contact **LCx CSC** if any of the readings fall outside of the expected ranges or if bead activity is not noted above the sample plate in each of the tubes.

Table 2: Expected RELATIVE POWER Meter Readings

Number of Tubes on Sample Plate	RELATIVE POWER Meter Reading
2	10 – 35
6	30 – 60
20	70 – 100

As Required Maintenance



WARNING:

- The LCx Lysor must be decontaminated prior to shipment or transfer from the laboratory.
- Do not immerse the LCx Lysor in liquid.

NOTE: Do not use cleaning materials that contain abrasives. These can damage the painted and anodized surfaces.

Cleaning

- 1. Turn the POWER switch to OFF and unplug the power cord.
- 2. Allow the sample plate to cool for at least five minutes.
- 3. Use a cloth moistened with water and wipe the enclosure, sample plate, sample chamber, and sample chamber cover.
- 4. Wipe dry.

Biohazard Decontamination

1. Turn the POWER switch to OFF and unplug the power cord.
2. Allow the sample plate to cool for at least five minutes.
3. Use a cloth moistened with 0.5% sodium hypochlorite (10% chlorine bleach) and wipe the enclosure, sample plate, sample chamber, and sample chamber cover.
4. Wipe the LCx Lysor surfaces with a cloth moistened with distilled water until chlorine bleach residue is no longer visible.
5. Wipe dry.

DNA Decontamination

1. Turn the POWER switch to OFF and unplug the power cord.
2. Allow the sample plate to cool for at least five minutes.
3. Use a cloth moistened with 1% sodium hypochlorite (20% chlorine bleach) and wipe the enclosure, sample plate, sample chamber, and sample chamber cover.
4. Wipe the LCx Lysor surfaces with a cloth moistened with distilled water until chlorine bleach residue is no longer visible.
5. Wipe dry.

Fuse Replacement

1. Turn the POWER switch to OFF and unplug the power cord.
2. Allow the sample plate to cool for at least five minutes.
3. Locate the fuse drawer which is at the rear of the LCx Lysor, directly above the power receptacle (See [Figure 4](#)).
4. Remove the fuse drawer by placing the blade of a flathead screwdriver below the fuse holder tab. Holding the screwdriver in a near vertical position, gently push up on the tab with the screwdriver. The fuse drawer will pop out of the LCx Lysor.
5. Replace the defective fuse(s). See [Characteristics and Specifications](#) for fuse types.

NOTE: Do not remove the gray plastic fuse holder from the fuse drawer. If the fuse holder is removed, verify that the correct voltage setting appears in the window above the fuse holder tab. See Installation Procedures for instructions.



WARNING: The voltage setting on the LCx Lysor must be compatible with your lab's power supply. Failure to set the Lysor to the proper voltage may result in Lysor failure, inadequate lysing, or fire.

6. Reinsert the fuse drawer into the LCx Lysor. Push until a click is heard.
7. Plug in the power cord.

Troubleshooting

Problem	Possible Cause	Corrective Action
ERROR indicator on.	<ol style="list-style-type: none"> 1. Sample chamber cover was opened during lysis. 2. START/STOP switch was pushed during lysis. 3. Electronics or power failure. 4. Voltage setting on Lysor is too high for supply voltage. 	<ol style="list-style-type: none"> 1. Press RESET switch and then START/STOP switch. 2. Press RESET switch and then START/STOP switch. 3. Contact LCx Customer Support Center (CSC). 4. Set voltage correctly. Refer to Installation Procedure
POWER Switch illuminates when in the ON position but fan does not operate (no exhaust air).	Fan failure.	Contact LCx CSC .
POWER Switch does not illuminate when in the ON position and fan does not operate (no exhaust air).	<ol style="list-style-type: none"> 1. Power supply is unplugged. 2. Power fuse has blown out or is defective. 3. POWER switch is defective. 4. Electronics failure. 	<ol style="list-style-type: none"> 1. Plug in the power cord. 2. Check/replace fuse after unplugging the LCx Lysor. 3. Contact LCx CSC. 4. Contact LCx CSC.
During timing verification, the RELATIVE POWER meter indicates incorrect cycle duration or number of cycles.	Electronics failure.	Contact LCx CSC .
Reading on the RELATIVE POWER meter is less than 5% even though lysis is occurring (bead activity is noted above the sample plate).	RELATIVE POWER meter failure.	Contact LCx CSC .
A slight shock is felt when touching the LCx Lysor.	Improper grounding of the LCx Lysor.	Connect the LCx Lysor to a properly grounded outlet. If problem persists, contact LCx CSC .
Leaking and/or melting specimen tubes.	<ol style="list-style-type: none"> 1. Incorrect specimen tubes were used. 2. Incorrect placement of tubes. 3. Electronics failure. 	<ol style="list-style-type: none"> 1. Use specified specimen tubes. 2. Refer to Table 1. 3. Contact LCx CSC.

Problem	Possible Cause	Corrective Action
During installation or Monthly Maintenance, the RELATIVE POWER meter indicates that an incorrect amount of power is being supplied to the sample plate.	Electronics or mechanical failure.	Contact LCx CSC .
During installation or Monthly Maintenance, bead activity is not noted above the sample plate in each tube.	<div>1. Voltage setting on Lysor is too high for the supply voltage.</div> <div>2. Electronics or Mechanical failure.</div>	<div>1. Refer to Installation Procedure to set voltage correctly.</div> <div>2. Contact LCx CSC.</div>

1. U.S. Department of Health and Human Services, Biosafety in Microbiological and Biomedical Laboratories HHS publication number (CDC) 93-8395.
2. World Health Organization. Laboratory Biosafety Manual. Geneva. World Health Organization, 1993.
3. National Committee for Clinical Laboratory Standards. Protection of Laboratory Workers from Infectious Disease Transmitted by Blood, Body Fluids, and Tissue: Tentative Guidelines. NCCLS Document M29-T2. Villanova, PA: NCCLS, 1991.
4. U.S. Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1910.1030, Occupational Exposure to Bloodborne Pathogens; final rule. Fed Register, 1991, 56: No. 235:64175-82.

NOTES