



BENCHTOP LABORATORY LAMINATOR

MODEL LL-100

OPERATING INSTRUCTIONS

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PRODUCT DESCRIPTION

Congratulations on the purchase of your new ChemInstruments LL-100 Bench top Laboratory Laminator. Your new Laminator is reliable and simple to use.



Warning: This equipment can cause injury if not used properly. It is the operator's responsibility to observe all safety rules and warnings.

This unit has the following features:

- Forward and reverse action of the drive roll
- Selectable speeds from 12 – 150 inches per minute (30 – 375 centimeters per minute) in either direction
- Continuous run and jog mode
- Precision crowned, #80 Durometer silicone rubber covered rolls
- Optional air piston movement of pressure roll
- Adjustable nip pressure
- 24 inch laminating width
- Emergency stop switch

SPECIFICATIONS

Electrical	120/240 VAC, 50/60 Hz, 3 amps
Air Pressure	40 – 100 PSI
Speed	12 – 150 inches/minute (1 inch increments) 30 – 375 centimeters/minute (2.5 centimeter increments)
Physical Dimensions	Width: 40 inches (1026 centimeters) Depth: 11 inches (28 centimeters) Height: 18 inches (46 centimeters)
Max opening at Nip	0.75 inch (20 millimeter)

UNPACKING

ChemInstruments has made every effort to ensure that the LL-100 arrives at your location without damage. Carefully unpack the instrument and check for any damage that may have occurred during shipment. If any damage did occur during transit, notify the **carrier** immediately.

The ChemInstruments LL-100 consists of the following parts:

- The laminator frame, which includes the motor/drive mechanism
- An envelope with this manual
- Power cord on unit around one of the pistons
- ¼ NPT air adapter mounted on unit.

Make sure all of these components are present before discarding the packaging material.

The Laminator is shipped with the pressure roll in the up position when supplied with the optional Gap Adjusters; otherwise the pressure roll will be in the down position.

The laminator is equipped with air pistons. It should be connected to a 90 – 100 PSI air source. A standard ¼ inch male quick connect is located on the back of the machine.



Photo 1 - Bench Top Laboratory Laminator

ASSEMBLY



Warning: Due to its weight and size, use two people to move the LL-100.

Carefully remove the Benchtop Laboratory Laminator from the packaging and set them on a sturdy bench top. Check the physical dimensions listed previously for the space required for the instrument. As with any precision piece of laboratory equipment, it is preferable to locate the LL-100 in an area where temperature and humidity are controlled to standard conditions of $72 \pm 2^\circ\text{F}$ and $50 \pm 5\%$ relative humidity.

Connect the power cord to its receptacle on the backside of the control cabinet. Complete the connection by inserting the male end of the power cord into a convenient AC outlet. Notice that the on/off power switch is located directly next to the power cord receptacle. A 3 amp fuse protects the motor.

Connect air to the air inlet connection on the backside of the control cabinet.



Warning: Make sure the power source matches the requirements of the Benchtop Laboratory Laminator machine. Damage will occur if this unit is plugged into the incorrect power supply.



Warning: Before proceeding with using the LL-100, it is advisable to become familiar with the Key Components. These Key Components and a brief description of their function follow in the next section.

KEY COMPONENTS

See photos 2, 3, and 4 for reference.

CONTROL CABINET BACK PANEL

- **POWER SWITCH** is located on the back panel of the control cabinet next to the AC power cord connection.
- **PRESSURE REGULATOR** controls the air pressure distributed to the air pistons.
- **AIR INLET CONNECTION** is the connection for the air source.

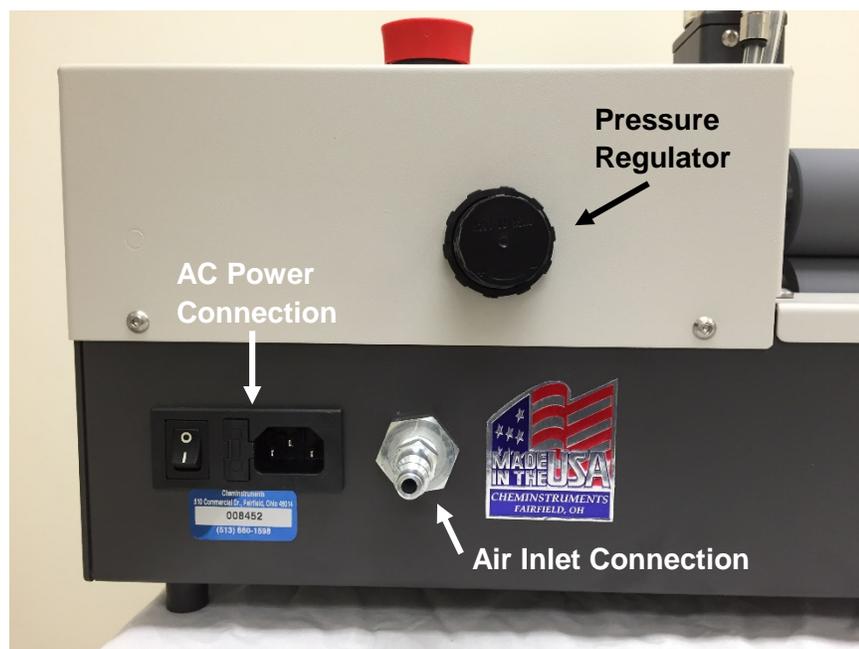


Photo 2 - Control Cabinet Back Panel

LAMINATOR

- **PRESSURE ROLL** the top roll supplying the laminating pressure.
- **DRIVEN ROLL** the bottom roll connected to the motor and supplying the drive to the laminator.
- **NIP** refers to the point of contact between the two laminating rolls.
- **FLOW CONTROL VALVES** controls the flow of exhaust air from the pistons, which controls the speed of the pressure roll moving up and down, do not adjust these are factory preset

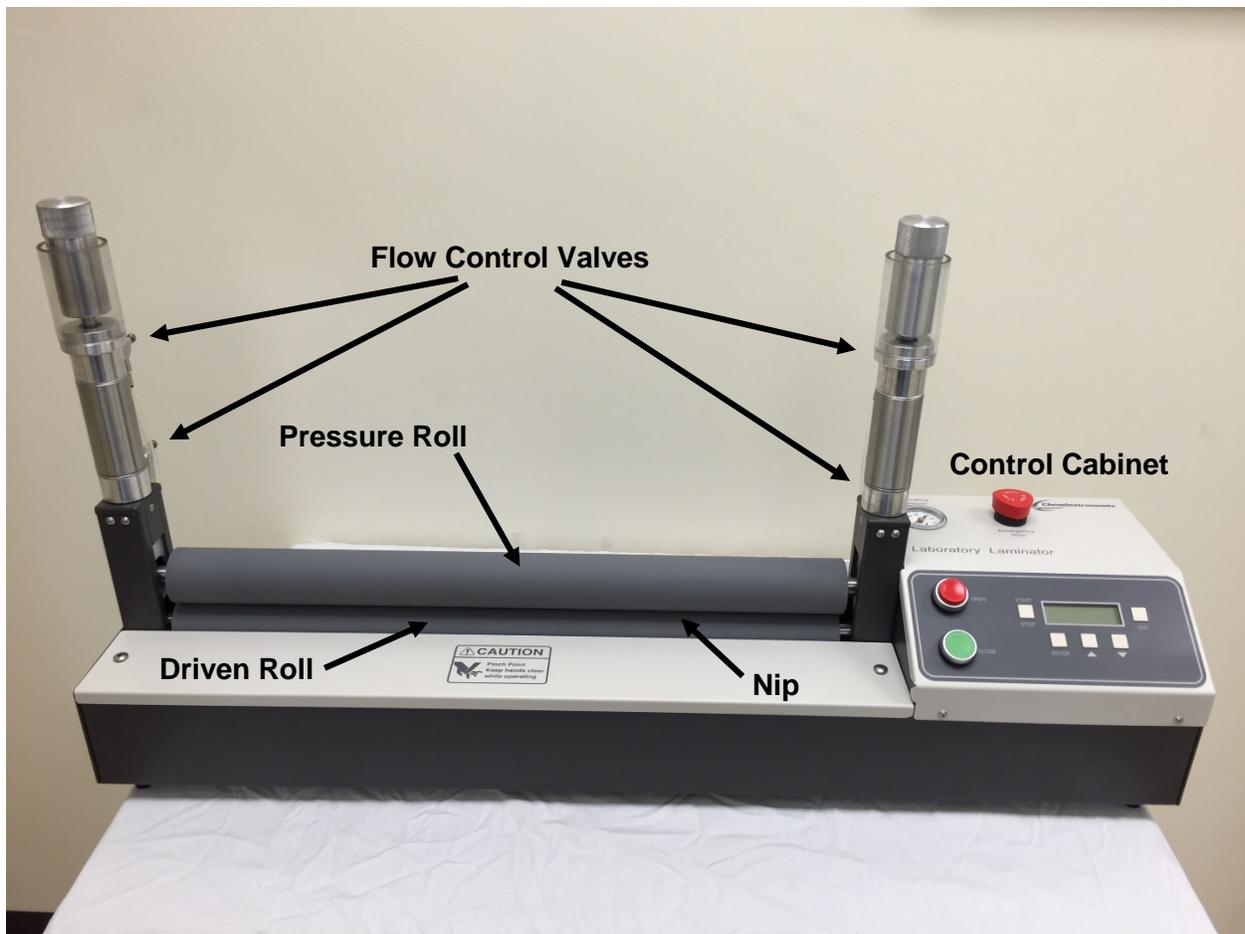


Photo 3 - LL-100

CONTROL CABINET FRONT PANEL

- **OPEN** moves top pressure roll to the up position
- **CLOSE** moves top pressure roll to the down position.
- **E-STOP** emergency stop disrupts all electrical and air supply, turn to release.
- **PRESSURE GAUGE** displays the air pressure being delivered to the air pistons after passing through the Pressure Regulator.
- **CONTROL PANEL SWITCHES** – See Control Panel Operation in Section 5.0, Theory of Operation, for a description of the functions of these switches



Photo 4 - Control Cabinet Front Panel

THEORY OF OPERATION



Warning: Possibility of crushing or pinching. 1) Do not insert limbs in the nip area while rolls are rotating. 2) Do not lower the top roll while limbs are in the nip area.

There are two 24-inch wide precision crowned rubber coated rolls. The top pressure roll is placed in contact with the bottom driven roll to form a nip. Material to be laminated is fed into the nip allowing the pressure of the rolls to pull the material through. (See Photo 3) The laminating pressure is regulated by either a set of adjustable thumbscrews or air cylinders mounted on the bearing blocks at the end of the pressure roll. The control panel regulates the speed and direction of the bottom driven roll.

POWER UP

Turn on the master power switch located on the back panel of the control cabinet next to the power line receptacle. The display will go through a power on self-test. It is also necessary to open the air supply valve.



Warning: Operating temperature for this equipment is 0 to 70 Celsius. The equipment needs to be completely free of condensation, inside and out, before applying power.

OPERATION

PRESSURE REGULATION

Turning the Pressure Regulator knob, located on the back of the control cabinet controls the pressure of the top roll at the nip. Turning the knob clockwise will increase the pressure and turning it counter clockwise will decrease the air pressure. The Pressure Gauge, located on the control cabinet, will display the current air pressure on the top pressure roll.

FLOW CONTROL VALVES

The Flow Control Valves regulate the speed of the top pressure roll as it moves up and down. Adjusting the valves in the following manner will regulate this movement. It may also be necessary to adjust these valves to balance the movement of the air pistons in order for the top pressure roll to travel evenly. If the speed of the two air pistons is not equal, one side of the top pressure roll will move faster than the other side.



Warning! Always operate with the top rolls downward motion at a slow speed.

The speed of the air pistons has been preset at the factory. These settings allow the top pressure roll to move downward at a safe, slow speed, and move upward rapidly. If it becomes necessary to adjust these valves, then use the following procedure.

- The bottom valve controls the down speed and the top valve controls the up speed.
- Turn the thumbscrews clockwise to go slower and counter clockwise to go faster.
- After each adjustment move the top pressure roll up by pressing the RED OPEN button and down by pressing the GREEN CLOSE button at least one time to determine the affect and need for further adjustment.
- Always maintain an even balance between the left and right Flow Control Valves to avoid uneven movement of the top pressure roll when traveling up and down.

CONTROL PANEL OPERATION

The LL-100 instrument allows the user to change speed and direction of the drive roll while it is moving. The control panel has a circular menu system. See Table 1 for a listing of selectable parameters.

The following describes the button operation for the Control Panel:

1. **START/STOP:** Pressing this button while there is no motion will move the drive roll at the set speed and direction as long as the Nip is in the lowered position. Pressing this button while the rolls are moving will cause motion to stop.
2. **JOG:** While this button is pressed, the rolls will move at the set speed and direction programmed as long as the Nip is in the lowered position. As soon as this button is released, motion will stop.
3. **ENTER:** This button is used to change the parameter displayed on the top line of the display. The display has a circular menu system.
4. **UP ARROW, DOWN ARROW:** These buttons will alter the value of the parameter that is displayed on the top line of the display. The values can be changed either when the rolls are moving or stationary.

The procedure for changing parameter values is as follows:

1. Press the **ENTER** button to change the parameter displayed on the top line.
2. The parameter displayed on the top line of the display can be altered by using the **UP ARROW** and **DOWN ARROW**.
3. The values can be changed while the rollers are moving.
4. For example, to change speed, press the **ENTER** button until the speed is displayed on the top line of the display. Press the **UP ARROW** or **DOWN ARROW** until the desired speed is displayed.

Table 1 - Parameters and Ranges

Speed	12 – 150 inches/minute (1 inch increments) 30 – 375 centimeters/minute (2.5 centimeter increments)
Direction	Forward or Reverse
Units	Inches or centimeters
Length	The displayed value is the measured length traveled since the last reset. This value is always incrementing even when the motor is reversed. If changing direction, then reset the length traveled by pressing the Up Arrow or the Down Arrow while the Length is displayed on the top line of the display.

INSTRUMENT OPERATION

The following describes basic instrument operation:

1. Press the **GREEN CLOSE** button to close the Nip.
2. Move the rolls by pressing the **START/STOP** button or the **JOG** button.
3. Change the speed or direction by following the procedure listed in Control Panel Operation.
4. Reset the displayed length by pressing the **UP ARROW** or **DOWN ARROW** while the Length is displayed on the top line of the display.
5. Press the **RED OPEN** button to open the Nip.

MAINTENANCE

TROUBLESHOOTING

The troubleshooting chart describes some problems that may occur over time. After determining the problem, follow one of the following maintenance procedures.

Table 2 – Troubleshooting Chart

Problem	Possible Cause	Procedure
Bottom Drive Roll does not turn	Check to make sure E-Stop is released	Turn E-Stop quarter turn counter clockwise
	Fuse blown	Check incoming power fuse. Replace with a 3-amp time delay fuse
	No power to motor	Check connections to power source
	Motor shaft coupling loose.	Perform procedure labeled Tightening the Drive Coupling
Top laminating roll does not turn with bottom roll and material	Contact between rolls is absent	Make sure the top roll is in the down position Increase the pressure to assure contact between the top and bottom rolls
	Gap adjusters set too high	
Top laminating roll does not rise when switched to up position	No air pressure	Check air connections and air regulator for proper connection and setting
	Exhaust airflow is being restricted	Check Flow Control Vales for proper operation
Top roll moves unevenly when it is being raised and lowered	Air pressure is being exhausted unevenly	Check Flow Control Valves

Table 3 – Troubleshooting Chart continued

Problem	Possible Cause	Procedure
Lamination has air bubbles	Air trapped between layers being laminated	Check for proper air pressure Make sure material is in the center of the rolls Make sure you have proper back tension on laminate Keep laminates apart till contact in the nip
Air system leaks	Tubing leak at connection	Perform procedure labeled Repairing Air Connections
Pressure roll will not lower	Pressure regulator is set to low	Adjust pressure regulator to a minimum of 40 PSI
	Flow control valves are closed	See Flow Control Valve section
No Air Pressure	Air supply not connected	Connect machine to compressed air line and make sure control valve is opened

MAINTENANCE PROCEDURES

Maintaining the LL-100 will provide many years of trouble free service. The following is a list of actions that should be taken as needed.

- On an annual basis, it is advisable to lubricate the air piston shafts with lithium grease.
- On occasion, the rollers may require cleaning. It is recommended that mineral spirits be used when cleaning the surface of the rolls.



WARNING: Do not use toluene to clean the rubber surface of the rolls. Toluene will damage the rubber surface.



WARNING: Do not clean the rolls when they are rotating and make sure the pressure roll is in the up position before cleaning either of the rolls.

- When idle, keep the rolls separate by moving the pressure roll to the up position. This helps prevent flat spots from developing on the rolls.

- If the laminator is not to be used for an extended period of time, cover the rolls to protect them from damage.
- Before turning the air off of the optional air pistons, place a soft protective material between rolls.
- If the laminator is equipped with the optional gap adjusters, they can be set to hold the pressure roll in the up position when the air is turned off.



WARNING: Do not adjust any of the potentiometers on the circuit board under any circumstances.

TIGHTENING THE DRIVE COUPLING

Should it be necessary to adjust the drive coupling between the motor shaft and the bottom driven roll, the following procedure should be followed.



Warning: Before working on this equipment and all electrical equipment, make sure you have disconnected the electrical power and air source.

1. Remove the panel by removing the four 6-32 screws holding the panel in place.
2. Carefully lift the panel upward and toward the back of the cabinet. Be careful not to pull any wires from their connection.
3. Locate the coupling joining the bottom roll shaft and the motor output shaft.
4. Line the coupling's setscrews up with the flats on the shafts of the roll and motor.
5. To prevent further slippage, remove the setscrews and put a drop of removable Loctite (or comparable product) on the setscrews before replacing them in the coupling.
6. Using a 3/32 allen key, tighten the two setscrews.
7. Replace the control panel, being careful not to pull or pinch any of the wires.

REPAIRING AIR CONNECTIONS

The air system in the Benchtop Laboratory Laminator consists of valves, tube and fittings. Should a leak develop it is likely to be at one of the tube and fitting connections. Determine where the leak is located and follow the procedure below to affect a repair.



Warning: Before working on this equipment and all electrical equipment, make sure you have disconnected the electrical power and air source.

1. Disconnect the air supply from the laminator.
2. Remove the panel by removing the four 6-32 screws holding the panel in place.
3. Carefully lift the panel upward and toward the back of the cabinet. Be careful not to pull any wires from their connection.
4. Remove the tubing at the connection that is nearest to the leak. To remove the tubing press in on the fitting while gently pulling the tubing itself out of the fitting.
5. Cut the end of the tubing at right angles to its length just beyond the leak.
6. Make sure you have a square solid end to the tubing before proceeding.
7. Simply push the tubing into the air fitting.
8. Replace the control panel, being careful not to pull or pinch any of the wires.