

**CHEMINSTRUMENTS**  
**HOT MELT DRAWDOWN COATER**  
**MODEL HLCL-1000**  
**OPERATING INSTRUCTIONS**

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## PRODUCT DESCRIPTION

Congratulations on the purchase of your new ChemInstruments Hot Melt Coater/Laminator model HLCL-1000. The HLCL-1000 is designed to produce coated samples of hot melt adhesives, and then laminate a variety of foils, films, and papers. The HLCL-1000 is designed to consistently coat and laminate on a lab scale with the following features:

- Brake unwind stands for both the coater and laminator
- Web alignment guides
- Precision ground coating bars
- Independently heated coating bars and reservoir
- Adjustable air pressure for changing laminating pressure
- Variable speed from 0.5 - 7.5 feet per minute (0.15 – 2.25 meters per minute)

## UNPACKING

Upon receipt of your new HLCL-1000, check the unit for any damage that might have occurred during shipment. The coating bars are wrapped to protect them during shipment. Carefully remove the wrapping (**DO NOT USE A KNIFE**). If any damage occurred during transit, notify the **carrier** immediately.

The shipping crate should contain the following:

- HLCL-1000
- Envelope containing manual and machine documentation
- Two brake unwind cores
- Set of Allen wrenches
- Bag containing:
  - Two Teflon side dams
  - Two thickness gauges
  - Four machine feet & four screws

## ASSEMBLY & INSTALATION

*The HLCL-1000 weighs over 160 pounds; **DO NOT** attempt to move it by yourself. Multiple people should always be used whenever the HLCL-1000 needs to be moved.*

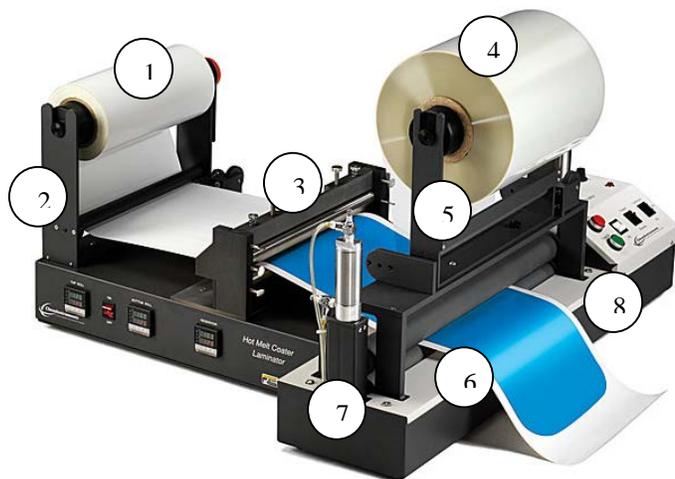
1. Remove the HLCL-1000 from the crate and set on a sturdy surface.
2. The feet on the bottom of the HLCL-1000 may be adjusted by turning clockwise or counterclockwise. Adjust the feet until the unit is level.
3. Unwrap the two brake unwind cores and place them on the top of the unwind stands.
4. Place the two Teflon side dams in the reservoir.

**OPTIONAL:** The laminator portion of the HLCL-1000 can be removed from the unit and placed further away from the coater if necessary. The laminator is held in place by four screws. These screws are located on the bottom of the laminator and accessed through the top of the laminator by removing the front and back guards. Each guard is held in place by two screws on either side of the top of the guard.

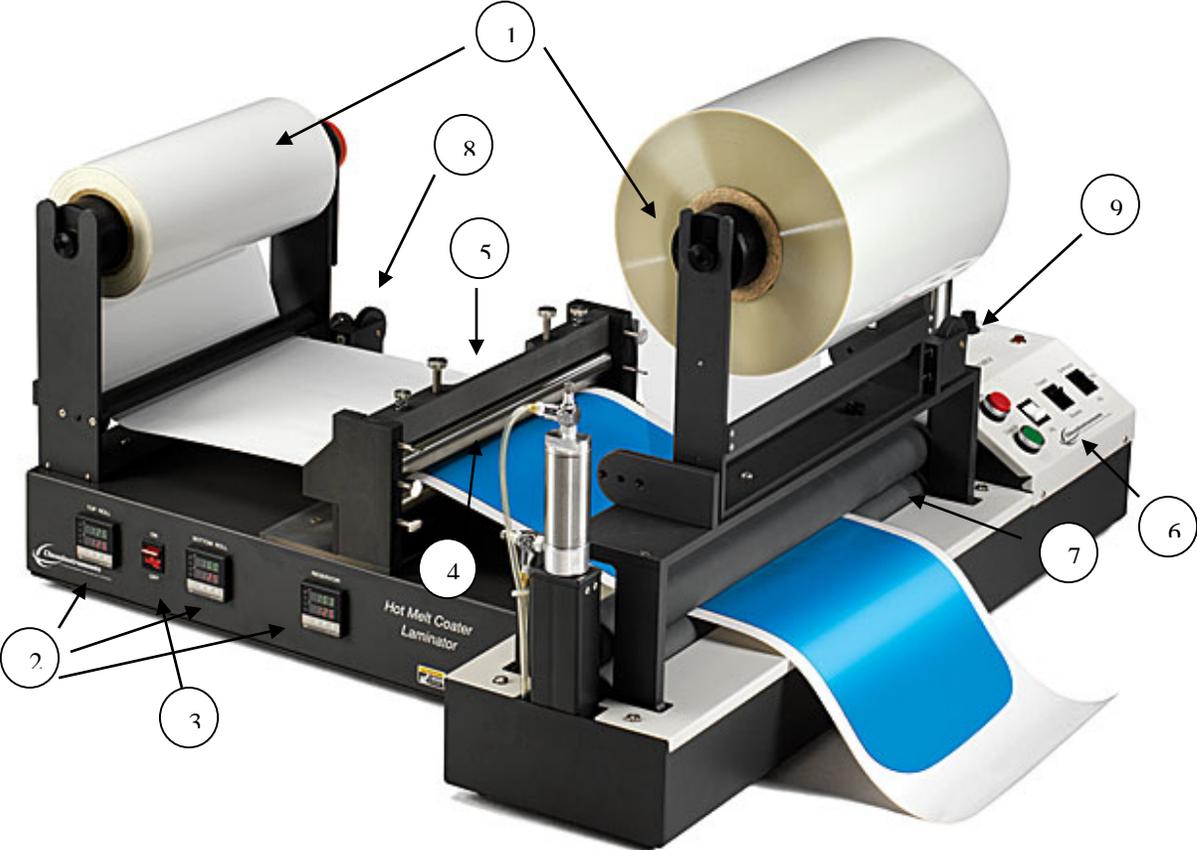
1. Remove the screws and the guards to access the bottom of the laminator.
2. Once the guards are removed, you will expose the screws which mount the laminator to the coater. Remove the screws. Store the screws in a safe place in case you wish to reattach the laminator.
3. Remove the laminator from the coater.
4. Replace the guards on the laminator. **The laminator should never be operated without the guards in place.**
5. The four extra feet included in with the HLCL-1000 are to be used on the bottom of the laminator if it is separated from the coater. Using the included screws, mount one foot in each corner of the laminator.

### Assembly and installation diagram:

1. Brake unwind core (*pictured with roll of film*)
2. Brake unwind stand
3. Reservoir for Teflon side dams
4. Brake unwind core (*pictured with roll of film*)
5. Brake unwind stand
6. Guard
7. Screw securing guard
8. Screw securing guard



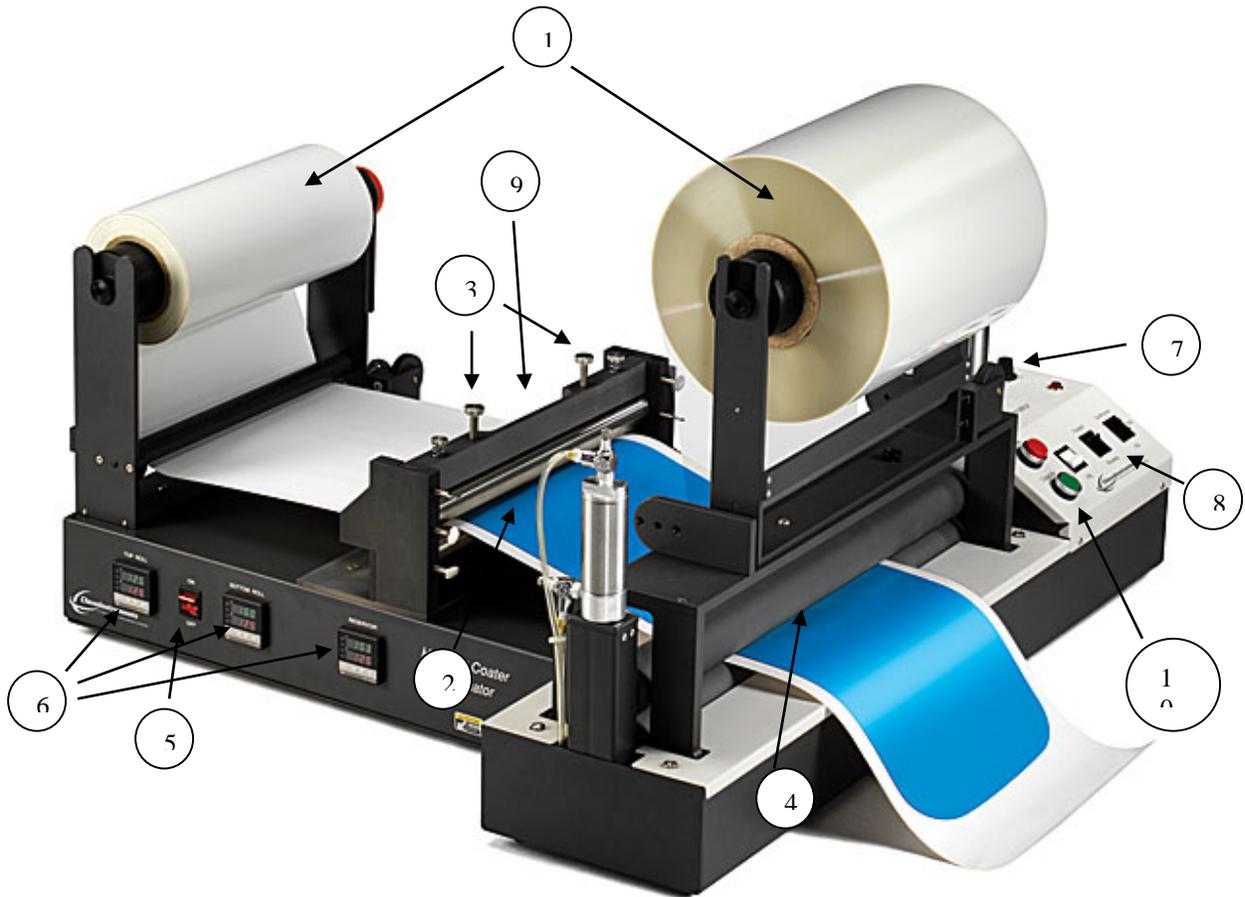
# KEY COMPONENTS



- 1. Brake unwind stand (pictured with roll of film mounted)
- 2. Heating controllers
- 3. Coater ON/OFF switch
- 4. Coating head
- 5. Reservoir
- 6. Laminator controls
- 7. Laminating nip
- 8. Alignment guide
- 9. Alignment guide

# OPERATION

The ChemInstruments HLCL-1000 allows you to produce lab scale simulations of production processes. The HLCL-1000 has the ability to heat each coating bar and the reservoir separately, which offers a greater range of control and diversity for your applications. The reservoir is not designed to melt your coating, only to keep it at set temperature. The following is a step by step process to create a finished product using the HLCL-1000.



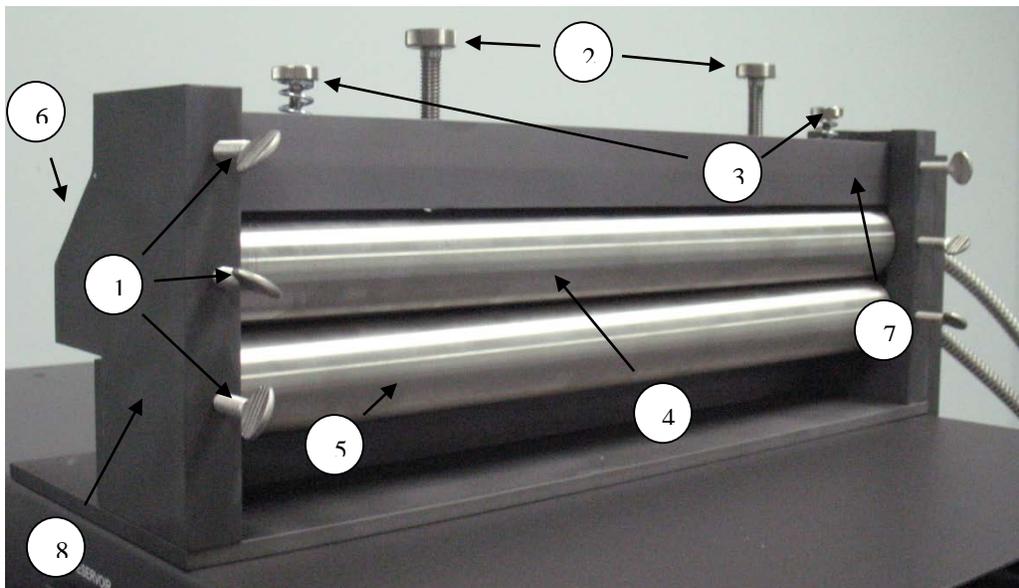
**The machine must be plugged in to the appropriate electrical and air source in order to operate safely and properly.**

1. Mount the desired substrate on the brake unwind cores and mount the brake unwind cores on the unwind stands.
2. Thread substrate from the unwind stand at the left of the machine through the coating head.
3. Set the coating head to the desired thickness of the coating you would like to produce.
4. Thread substrate from both unwind stands through the laminator nip.
5. Turn on the coater.
6. Program the desired temperature for the top coating bar, bottom coating bar, and reservoir.
7. Turn on laminator. (ON/OFF switch is located on the back of the laminator next to the plug.
8. Set laminator controls: speed, pressure, and direction.
9. Place Teflon side dams in reservoir to the desired width you would like to make the coating, and pour the pre-heated coating into reservoir.
10. Close laminator nip to produce coating.

The HLCL-1000 should be run until the reservoir is empty and a coating is no longer being produced. To stop the HLCL-1000, open the laminator nip. After the HLCL-1000 has cooled to ambient temperature, disassemble and thoroughly clean the coating head.

## COATING HEAD

1. Thumbscrews
2. Gap Adjusting Screws
3. Tension Screws (These secure the top coating bar to the Crossbar. They are set in the factory and do not require any adjustment)
4. Bottom Coating Bar
5. Top Coating Bar
6. Reservoir
7. Crossbar
8. Upright



## SETTING COATING GAP

The follow directions will allow you to set the gap on the coating head to create a coating of a desired thickness.

1. With the power off and the heating elements at room temperature, remove the heating element from the reservoir. There is a plate that holds the heating elements in place which must be removed. The plate is held in place by two screws. Remove the screws and pull out the heating element.
2. Remove the reservoir.
3. Tighten the bottom thumbscrews on either side of the bottom coating bar.

4. Thread the substrate through the coating head in between of the top and bottom coating bar.
5. Move the crossbar up so that the top of the crossbar is level with the uprights. Tighten the top thumbscrews on either side of the crossbar to secure the crossbar.
6. Follow the steps bellow to set the gap between the top and bottom coating bars to the desired thickness of coating you would like to produce:
  - a. The gap adjusting screws can be turned clockwise to lower the top coating bar or counter-clockwise to raise the coating bar. Raise the top coating bar to create a gap between the top and bottom coating bars.
  - b. The thickness gauges have multiple shims with their thickness stamped on them. Find the desired shim and place each shim between the substrate and top coating bar. Be sure to place them on opposite sides of the top of the substrate to insure a uniform gap along the length of the substrate.
  - c. Turn the gap adjusting screws clockwise to lower the top coating bar on to the shims of the thickness gauges.
  - d. Tighten the middle thumbscrews on either side of the top coating bar to secure it in place, and remove the thickness gauges.
7. Replace the reservoir.
8. Replace the heating element in the reservoir and reattach the plate holding the heating elements in the reservoir and coating bars.



## RESERVOIR

The reservoir is located on the back of the coating head. The Teflon dam inserts are placed in the reservoir as shown in the picture. The dam inserts can be positioned anywhere in the reservoir to create the specified width of the coating you would like to create.



## CLEANING

The coating head can be disassembled for cleaning. **\*BE SURE THE MACHINE IS TURNED OFF AND THE COATER IS AT ROOM TEMPERATURE\***

1. Remove the plate on the right side of the machine that holds the heating elements in place.
2. Remove the heating elements from the top and bottom coating bars and the reservoir. **\*HEATING ELEMENTS MAY BE HOT EVEN IF COATING BARS ARE ROOM TEMPERATURE\***
3. Loosen the thumbscrews and remove the top and bottom coating bars and the reservoir.
4. The top and bottom coating bars can be cleaned with a soft cloth and solvent. Be sure to only use a soft cloth that will not cause scratches to the coating bars.

## SETTING TEMPERATURE

Follow the instructions below to set the temperature for the top coating bar, bottom coating bar, and reservoir. The temperature of the top coating bar, bottom coating bar, and reservoir are all controlled independently. **\*BE SURE THE MACHINE IS PLUGGED INTO AN APPROPRIATE POWER SOURCE\***

1. Turn the machine on.
2. Push the **SET** button.
3. The temperature setting under **SV** will start blinking.
4. Use the < arrow to select which number you would like to change.
5. Use the ^ or v buttons to select the correct number for the temperature you would like to set.
6. Once you have selected the correct temperature, press the **SET** button to set the coater to the programmed temperature.



## MICROMETERS (optional)

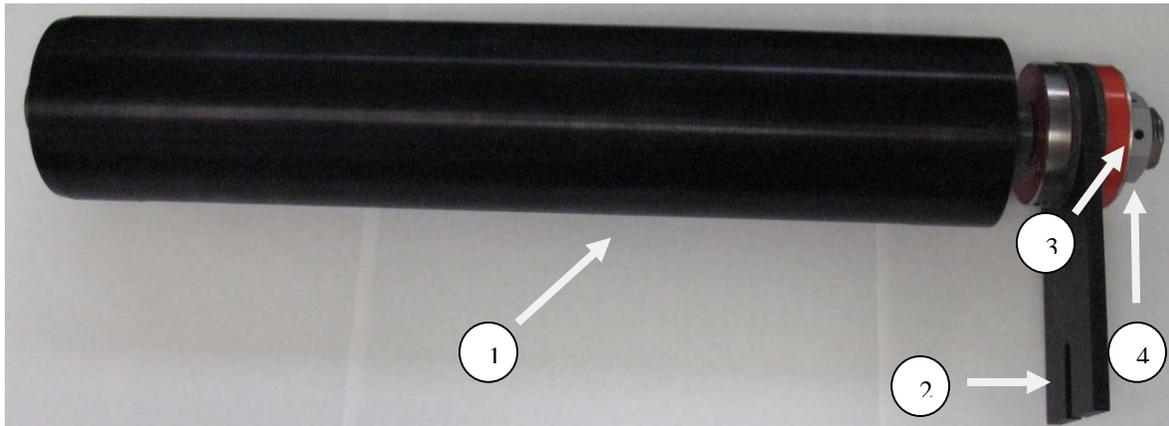
The micrometers for the HLCL-1000 are optional. The micrometers are mounted on crossbar of the coating head (see diagram under COATING HEAD). The micrometers allow a faster way to set the gap between the top and bottom coating bar. Follow the directions below to use the micrometers:



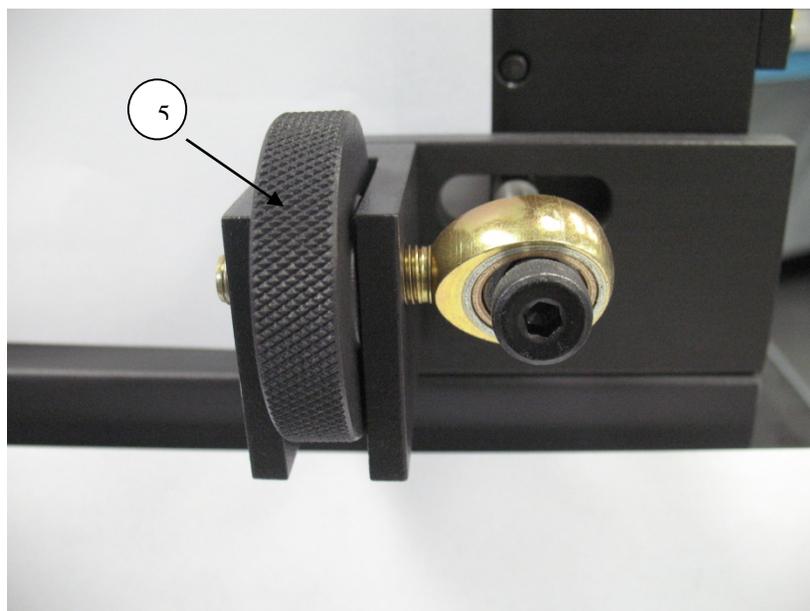
1. With the power off and the heating elements at room temperature, remove the heating element from the reservoir. There is a plate that holds the heating elements in place which must be removed. The plate is held in place by two screws. Remove the screws and pull out the heating element.
2. Remove the reservoir.
3. Tighten the bottom thumbscrews on either side of the bottom coating bar.
4. Thread the substrate through the coating head in between of the top and bottom coating bar.
5. Move the crossbar up so that the top of the crossbar is level with the uprights. Tighten the top thumbscrews on either side of the crossbar to secure the crossbar.
6. Turn the gap adjusting screws clockwise to lower the top coating bar until it rests on the substrate between the top and bottom coating bars.
7. Turn the micrometer dial so the hand points to zero.
8. Turn the gap adjusting screws counter-clockwise to raise the top coating bar. The micrometers will indicate the gap created between the top and bottom coating bar caused by raising the top coating bar. This gap will be thickness of the coating created.
9. Once the desired gap is reached, tighten the thumbscrews on either side of the top coating bar to lock it in place.
10. Replace the reservoir.
11. Replace the heating element in the reservoir and reattach the plate holding the heating elements in the reservoir and coating bars.

## BRAKE UNWIND STANDS

The HLCL-1000 has two Brake Unwind Stands. One is located to the left of the coating head and the other is located on top of the laminator. The Brake Unwind Stands allow for the substrate you are coating or laminating with to be kept under tension during the coating/laminating process. Tension is controlled by adding or relieving pressure to the friction plate.



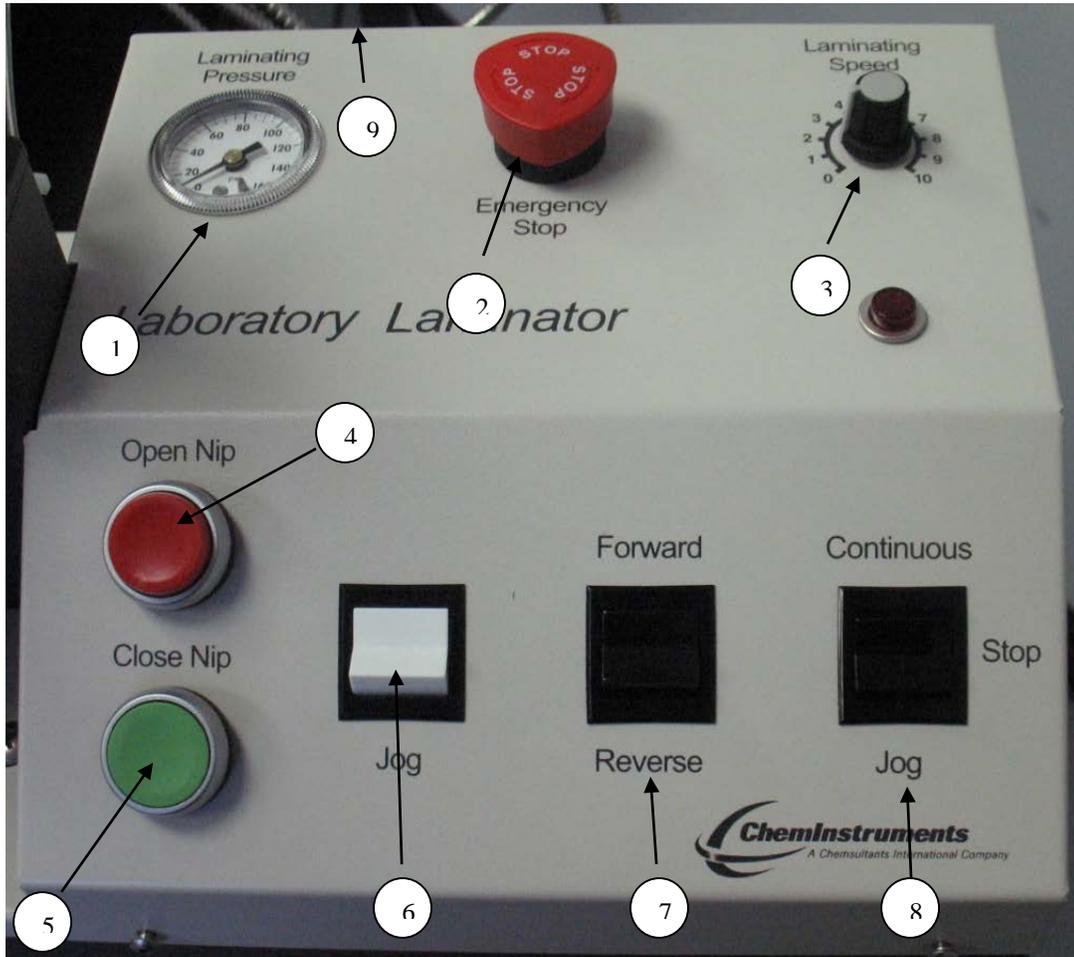
1. 3 inch core.
2. Friction plate.
3. Set screw.
4. Nut.
5. Alignment wheel.



Follow the procedure below to load a substrate on the 3 inch core and adjust the amount of friction on the brake system.

1. Slide a roll of material onto the 3 inch core. **\*CAUTION: the 3 inch core has knife blades on it which are used to cut into the core of the roll of material and prevent it from spinning. These knife blades are very sharp and can easily cut skin. Caution should be taken when loading or unloading rolls of material to prevent injury. ChemInstruments recommends wearing cutting gloves to protect hands during loading and unloading.\***
2. Place the core and friction brake assembly onto the Brake Unwind Stand.
3. Loosen the set screws using an Allen wrench.
4. Turn the nut clockwise (add tension) or counter-clockwise (relieve tension).
5. Tighten the set screws using an Allen wrench.
6. Thread the substrate through the coating head or laminator.
7. Align the substrate through the coating head or laminator using the alignment wheel. Turning the alignment wheel will move the Brake Unwind Stand clockwise or counter-clockwise in order to align the substrate to travel straight through the coating head and laminator nip.

# LAMINATOR CONTROLS

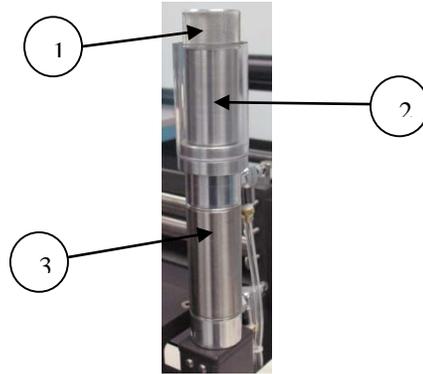


1. Laminating Pressure Gauge: Displays the line pressure of the laminator. Pressure can be adjusted using the pressure control located directly behind the laminating pressure gauge on the back of the cabinet.
2. Emergency Stop button: Push the emergency stop button to cut off electricity to the laminator and immediately open the laminating nip. Turn the button clockwise to disengage and restore power to the laminator.
3. Speed control: Turn clockwise to increase speed or counter-clockwise to decrease speed of laminator rolls.
4. Open Nip button: Push the open nip button to open the laminator nip.
5. Close Nip button: Push the close button to close the laminator nip.
6. Jog button: Push and hold the jog button to rotate the bottom the laminator roll. Release the button to stop the bottom laminator roll from rotating.
7. Forward/Reverse button: Push the button to forward or reverse to control the direction the bottom laminator roll will rotate.
8. Continuous/Stop/Job button: Push the button to continuous, stop, or jog to control the bottom laminator rolls rotation. Continuous will allow the bottom roll to rotate continuously. Stop will not allow the bottom roll to rotate. Jog will allow the bottom roll to rotate when the jog button is pushed and held.
9. Pressure Regulator (not pictured): Turn the regulator knob counter-clockwise to increase pressure and clockwise to decrease pressure at the laminator nip.

## GAP ADJUSTERS (optional)

The optional Gap Adjusters are designed to help create a gap between the laminator's top and bottom rolls.

1. Gap Adjuster.
2. Guard.
3. Piston.



Follow the directions below to create a gap between the laminator's top and bottom rolls:

1. Plug the laminator into the appropriate power and air supply.
2. Press the Open Nip button on the laminator controls to raise the laminator's top roll.
3. Turn the Gap Adjusters (on both sides of the machine) counter-clockwise to loosen it.
4. Push the Close Nip button on the laminator controls.
5. The laminator's top roll should come down and make contact with the bottom roll. If it does not, repeat steps 3-5 until the top roll rests on the bottom roll.
6. Once the laminator's top roll is resting on the bottom roll, turn the Gap Adjuster clockwise to lower it until it makes contact with the Piston.
7. Push the Open Nip button on the laminator controls.
8. Turn the Gap Adjuster (on both sides of the machine) clockwise to lower it. The distance the Gap Adjuster is lowered is the gap that will be created.
9. Push the Close Nip button on the laminator controls. There will now be a gap between the laminator's top and bottom rolls.
10. If the gap is not large enough, repeat steps 8-12 until the desired gap is reached.
11. If the gap is too large, repeat steps 8-12 but turn the cap and set screw counter-clockwise instead of clockwise.

## TROUBLESHOOTING (COATER)

PROBLEM	PROBABLE CAUSE	PROCEDURE
Power switch not lit	Machine not plugged in.	Plug machine in appropriate power supply.
	Blown fuse.	Replace fuse.
Controller displays "LBA"	Thermocouple wires loose or disconnected.	Check connections inside control box. (See below A)
	Heating rod thermocouple bad.	Replace heating rod. Call ChemInstruments.
Green OUT lamp lit, PV not increasing, but coating head temperature is increasing	Controller is bad.	Replace controller. Call ChemInstruments.
Green OUT lamp lit, PV not increasing, coating head temperature not increasing	Heating rod wires loose or disconnected.	Check connections inside control box. (See Below - B)
	Relay loose or bad.	Check relay and replace if necessary. (See below - C)
	Controller is bad.	Replace controller. Call ChemInstruments.

**UNPLUG THE MACHINE BEFORE ATTEMPTING MAINTENANCE PROCEDURES!**  
**ELECTRIC SHOCK MAY OCCUR IF THE MACHINE IS PLUGGED IN!**

A – Thermocouple connections:

1. Each heating rod cable contains four wires. The thermocouple wires are the small red and white wires. The red wires should be connected to terminal 8 on the back of the Fenwal heating controller.
2. The white wires should be connected to terminal 9. Check all six connections.
3. If "LBA" is displayed on the front of a Fenwal Temperature Controller, this means there is a break in the thermocouple connection for that controller. If the above connections are not bad, then the internal thermocouple must be bad, and the entire heating rod must be replaced.

Note: The thermocouple wires are solid wire, making it easy to break or crack if bent too severely. When checking these connections, be gentle with this wire.

#### B – Heating rod connections:

1. Each heating rod cable contains four wires. The two larger wires are hot and neutral. The hot wires from each of the rods are connected to a red butt splice, which has a yellow wire running to terminal 6 of the relay sockets.
2. The remaining neutral wire is connected to a blue butt splice, which has a white wire running to terminal 7 of the relay sockets. This white wire is connected to all heating rods, all controllers, and all relay sockets through a series of blue butt splices. If one of these connections is loose, the rods will not heat up.
3. Make sure these connections are tight.

#### C – Replacing the relay:

1. The relays are the clear plastic boxes. First check to make sure each relay is firmly seated by pushing down gently.
2. If the relay doesn't move, continue with replacement. If it does move, firmly seat the relay, reassemble the unit, and test.
3. To remove a relay, wiggle it in a circular motion while gently pulling it out of the socket.
4. Install a new relay by lining up the tab on the plastic post on the bottom of the relay with the mating part in the socket. Push it firmly into the socket.

## TROUBLESHOOTING (LAMINATOR)

PROBLEM	PROBABLE CAUSE	PROCEDURE
Bottom Drive Roll does not turn.	No power to motor.	Check connections to power source.
	Fuse blown.	Check incoming power fuse. Replace fuse if necessary.
	One or more of the switches is in the off positions.	Check switches.
	Motor shaft coupling loose.	Perform procedure A below.
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.
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 valves for proper operation.
Top roll moves unevenly when being raised or lowered.	Air pressure is being exhausted unevenly.	Check flow control valves.
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.
Air system leaks.	Tubing leak at connection.	Check for leak in tubing at connection. Replacing tubing if necessary.
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.	Open flow control valves.

No air pressure.	Air supply not connected.	Connect machine to compressed air line and make sure flow control valve is open.
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A – Tightening the drive coupling:

1. Remove the four #6-32 screws holding the control 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 set screws up with the flats on the shafts of the roll and motor.
5. To prevent further slippage, remove the set screws and put a drop of removable Loctite (or comparable product) on the set screws before replacing them in the coupling.
6. Using a 3/32 Allen wrench, tighten the two set screws.
7. Replace the control panel, being careful not to pull or pinch any of the wires.