HOT MELT LABORATORY COATER LAMINATOR

MODEL HLCL-1000

OPERATING INSTRUCTIONS

CHEMINSTRUMENTS

510 COMMERCIAL DRIVE

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Revision 1.1

July 31, 2018

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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 featues.

- 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)

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

SPECIFICATIONS

Electrical	120 VAC, 50/60 Hz, 15 amps or 240 VAC 50/60 Hz, 8 amps
Product Sample Width	3 inches (7 centimeters) to 12 inches (30 centimeters)
Reservoir Capacity	Up to 125 mL
Reservoir Temperature	Up to 400 degrees Fahrenheit (204 degrees Celsius)
Physical Dimensions	Width: 33 inches (84 centimeters) Depth: 37 inches (94 centimeters) Height: 22 inches (56 centimeters) Weight: 160 pounds (73 kilograms)

UNPACKING

ChemInstruments has made every effort to ensure that the HLCL-1000 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 coating bars are wrapped to protect them during shipment. Carefully remove the wrapping. **DO NOT USE A KNIFE**.

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

The HLCL-1000 consists of the following parts:

- An envelope with this manual.
- Two brake unwind cores.
- Set of Allen wrenches
- Bag Containing:
    - Two Teflon side dams
    - Two thickness gauges
    - Four machine feet & four screws

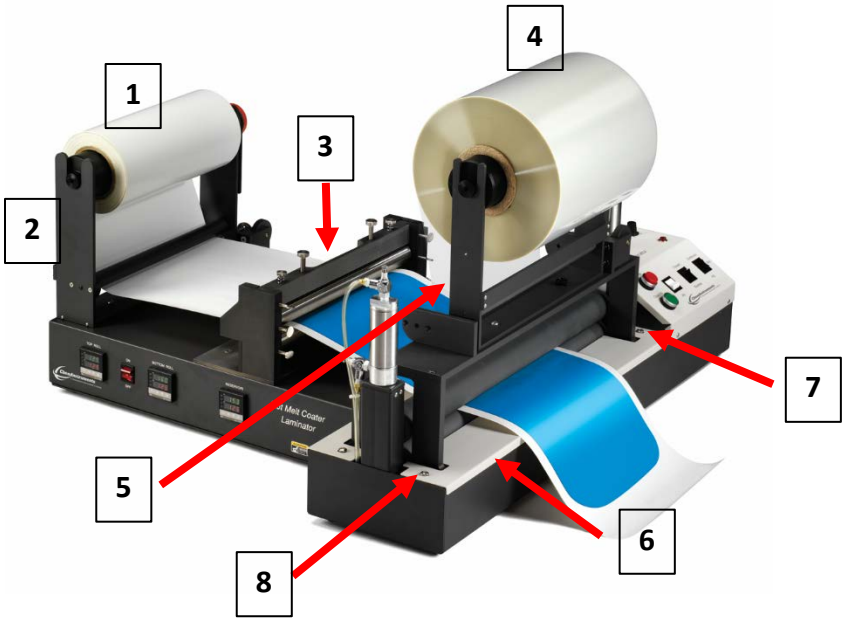
ASSEMBLY

Warning: The HLCL-1000 weighs over 160 pounds. DO NOT attempt to move it by yourself.

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 on the top of the unwind stands.
4. Place the two Teflon side dams in the reservoir.

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



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 for 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.

THEORY OF 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.

POWER UP

Turn power on with the master switch located on the front panel.

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.

Warning: Make sure the power source matches the requirements of the HLCL-1000 machine. Damage will occur if this unit is plugged into the incorrect power supply.

CONTROLLER OPERATION

The heating controllers are preset and tested at the factory before shipment. They are ready to begin operating as soon as the power switch is turned on. The actual temperature of the coating bars or back dam are the process values and are displayed on top of each controller under PV. The desired temperature is the set point and is displayed on the bottom under SP. The green lamp labeled OUT will light when the coating head is being heated. AL1 and AL2 are alarms that are not used with this unit. The AT lamp is lit during auto-tuning. **This has already been completed at the factory and should not be repeated.**

When the power switch is first turned on, the two displays of each controller will display preset parameters for the first four (4) seconds. This will include whether the display is set for Fahrenheit or Celsius and the maximum and minimum set point values. The display will then automatically change to display the process value and set point. This is the normal operating mode.

After turning on the heater and changing the set points, allow the unit to stabilize. The factory has tested the unit at 250˚F. It usually takes 45 minutes to 1 hour for the unit to fully stabilize.

Warning: Once the heater is turned on, the temperature will rise very quickly. The 45 minutes mentioned above is the time for full temperature stabilization. It is not the time needed for the coating head to come up to temperature.

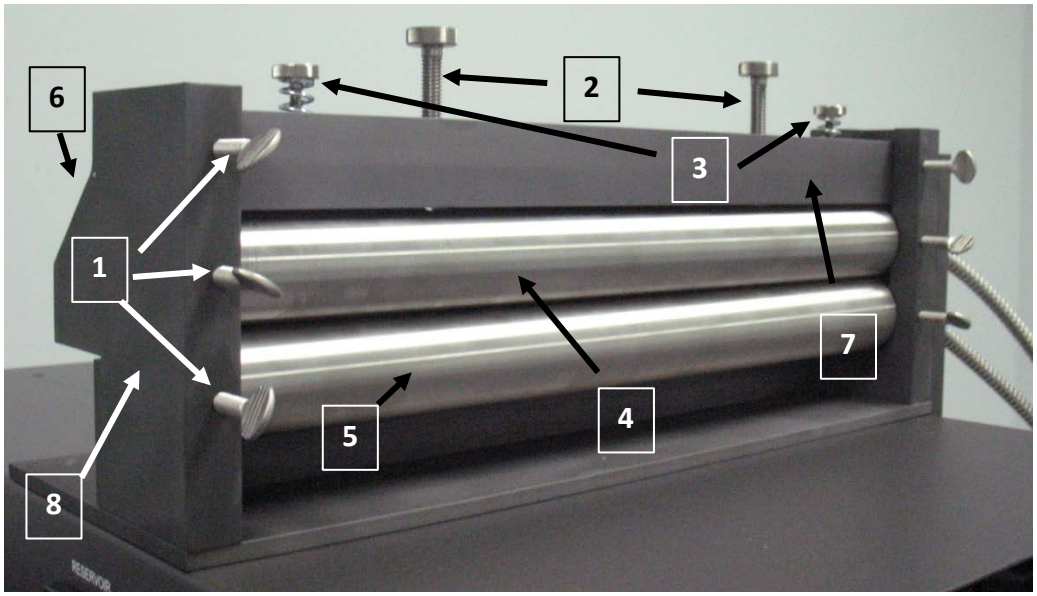
NOTE: When you first turn on power, you may notice the smell of burning oil. This is normal as oil is used as a cooling agent when boring the holes in the coating bars.

NOTE: It is very important to let the machine run for 45 minutes after each adjustment to allow the temperature to stabilize.

Warning: Allow the coating bars, the back dam, and the heating rods to cool to room temperature before touching.

TOUCHING HOT COATING BARS, BACK DAM, OR HEATING RODS WILL CAUSE SEVERE INJURY!!!

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. Top Coating Bar
5. Bottom Coating Bar
6. Reservoir
7. Crossbar
8. Upright

OPERATION

The machine must be plugged into 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 the 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. See LL-100 operation manual for instructions.
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 the reservoir.
10. Close laminator nip to produce the 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.

SETTING COATING GAP

The following 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 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 below to set the gap between the top and bottom coating bars to the desired thickness of the coating to be produced:
    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 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 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.

NOTE: BE SURE THAT 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. **NOTE: THE HEATING ELEMENTS MAY BE HOT EVEN IF COATING BARS ARE AT 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

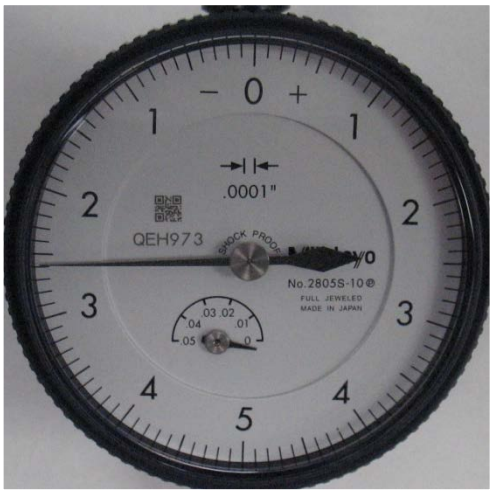
Follow the instructions below to set the temperature for the top coating bar, bottom coating bar, and reservoir. The temperature of the top coating bar, bottom coating bar, and reservoir are all controlled independently.

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 up and down buttons to select the correct number for the temperature.
6. Once the correct temperature is entered, press the **SET** button to set the coater to the programmed temperature.
7. When no entry has been made for a period of one (1) minute, the controller will return to normal operation with the last recorded set point.

MICROMETERS (OPTIONAL)

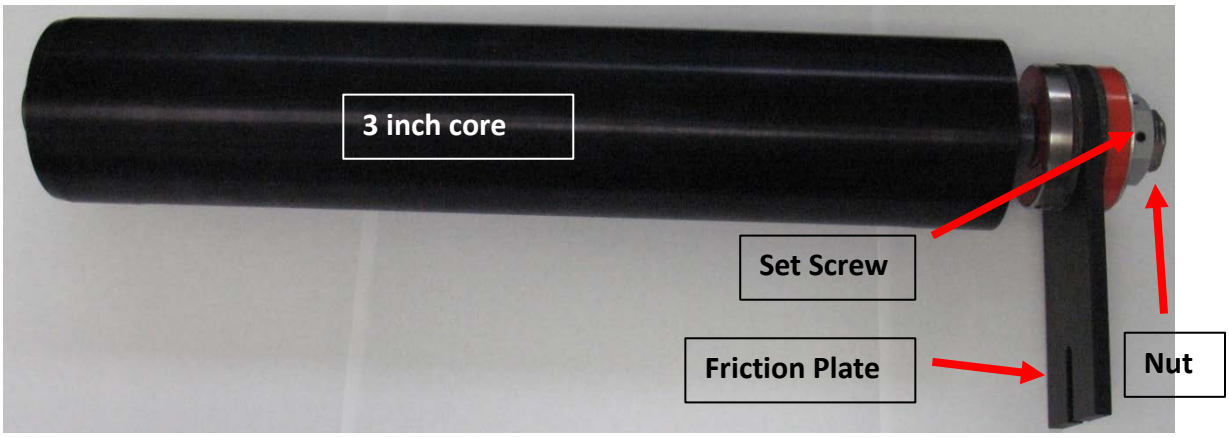
The micrometers for the HLCL-1000 are optional. The micrometers are mounted on the crossbar of the coating head. The micrometers allow for a faster way to set the gap between the top and bottom coating bars. Follow the directions below to use the micrometers.

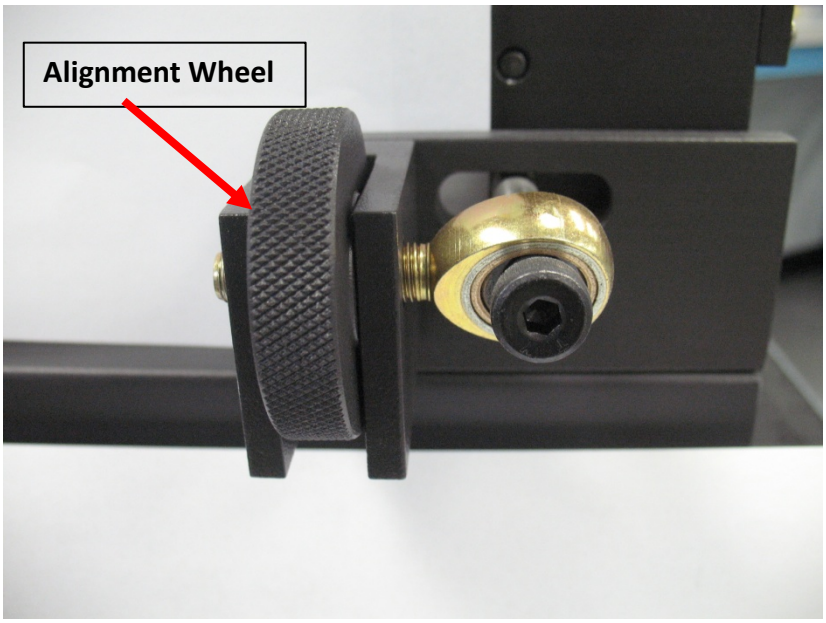
1. With the power off and the heating elements at room temperature, remove the heating element from the reservoir. There is a plate that holds the heating elements in place which must be removed. The plate is held in place by two screws. Remove the screws and pull out the heating element.
2. Remove the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





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 to add tension. Turn the nut counter-clockwise to relieve tension.
5. Tighten the set screw 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

Refer to Benchtop Laboratory Laminator's (LL-100) operating instructions for details on using and operating the laminator controls.

MAINTENANCE

The ChemInstruments HLCL-1000 is a very simple machine. It requires very little maintenance. However, the machine requires a thorough cleaning after every use. The coating bars are precision ground and must be kept clean to repeatedly provide quality coatings.

CLEANING

After finishing the coating job, turn off the controller and allow the unit to cool. When the coating bars are cool, disassemble the coating head. **The heating rods may still be warm even though the coating bars are cool!!!** If possible, soak the bars, dam, and back dam in solvent overnight.

NOTE: If it is necessary to scrub the coating bars, use only a soft cloth. The bars are precision ground and any scratches to the surface will affect the accuracy of the coatings.

The nature of some adhesives may make it necessary to clean the unit while it is still warm.

Warning: Use extreme caution if it is necessary to clean the unit while it is still warm.

TROUBLESHOOTING

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

UNPLUG THE MACHINE BEFORE ATTEMPTING MAINTENANCE PROCEDURES!

ELECTRIC SHOCK MAY OCCUR IF THE MACHINE IS PLUGGED IN!

Troubleshooting Chart

Problem	Possible Cause	Procedure
Power switch not lit	Machine not plugged in.	Plug machine into correct power source.
	Fuse blown.	Replace with correct fuse.
Controller displays "LBA"	Thermocouple wires loose or disconnected.	Check connections inside control box. (See Below – A)
	Heating rod thermocouple is 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.

A. THERMOCOUPLE CONNECTIONS

1. Each heating rod cable contains four wires. The thermocouple wires are the small red and white wire.
    a. The red wire should be connected to terminal 9.
    b. The white wire should be connected to terminal 8.
2. Replace the back panel making sure not to pinch any wires.
3. If "LBA" is displayed on the front of the heating controller, then 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. 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.

REPLACEMENT PARTS

Part Number	Description
R-HLCL MOTOR	Replacement Motor for HLCL
R-HLCL UNWIND CORE	Replacement 3" Core for LC, HLC, HLCL Unwinds, Includes Break
R-HL/HLC/HLCL FUSE HOLDER	Replacement Fuse Holder for the HL/HLC/HLCL
R-HL/HLC/HLCL HEATING CONTROL	Replacement Heating Controller for HL/HLC/HLCL
R-HL/HLC/HLCL RELAY	Replacement Relay for the HL/HLC and HLCL series