

TIMBERLINE INSTRUMENTS

TL-105 COLUMN HEATER

INSTRUCTION MANUAL

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Timberline Model TL-105 Column Heater Instruction Manual

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TL-105 FEATURES

PRINCIPLE OF OPERATION

The Timberline TL-105 Column Heater provides temperature control with a stability of $\pm 0.05^{\circ}\text{C}$. Typical accuracy of the RTD sensor and controller is within 1°C . The sophisticated microprocessor based controller contains PID calibration capability and a high temperature shut off. The system is calibrated before shipment and the PID constants are locked in memory. The temperature limit is set at 100°C . The limitation of the system for temperature is the gray polypropylene thermal insulation (120°C) surrounding the oven bed.

ADVANTAGES OF HPLC COLUMN TEMPERATURE CONTROL

Controlling the temperature of HPLC columns has many advantages including

- Retention time stability
- Reduced detector noise and baseline drift
- Simplified method transfer

Elevating the column temperature can improve separations.

- Faster separation as retention decreases as temperature increases
- Improved peak shape by reducing on-column silanol effects
- Improved ion exchange efficiency
- Lower backpressures by to reduction in mobile phase viscosity
- Selectivity changes for better separations

ELECTRICAL DESCRIPTION

HEATER AND CONTROL CIRCUIT DESCRIPTIONS

The microprocessor base controller provides a 5-volt signal, actuating a solid-state relay which, controls power to a 150-watt silicone heater. The 150-watt heater contains four leads in order that the input module can provide series operation of the two heater sections for 220-240V operation. During 110V operation, two heater sections are operated in parallel. The controller sensor is a 100-ohm RTD probe inserted into a 0.16" hole in the aluminum block. The RTD probe is placed very adjacent to the silicone heater to provide close temperature control.

THERMAL FUSE PROTECTION

The heater is equipped with a secondary form of over temperature protection in a 128°C thermal fuse. If a failure occurs in the electronic circuitry, the thermal fuse will protect the apparatus against an over temperature condition. The thermal fuse must be replaced when an over temperature condition opens the heater circuit. Contact Timberline for parts and replacement instructions.

ELECTRICAL FUSE PROTECTION

The standard configuration for 120V operation is one 2A, 250V fuse. The configuration for 240V operation is one 1A, 250V fuses.

MOBILE PHASE HEAT EXCHANGER



Figure 2: HX-101 Heat Exchanger

The TL-105 Column Heater comes equipped with a pre-column heat exchanger. This passive device transfers heat from the floor of the heated zone to the inlet tubing. This action heats the incoming mobile phase prior to entry into the HPLC column. Without preheating, there is a significant difference in temperature between the incoming mobile phase and the column which greatly degrades column efficiency and causes severe band broadening and peak splitting. This is due to radial temperature and viscosity gradients in the column. When the mobile phase temperature is lower than the column temperature, the fluid temperature in the heated column will be higher near the wall than it is in the center. This will result in lower retention and viscosity near the tube wall causing peak broadening and splitting.

The HX-101 heat exchanger contains a spool, plus an inlet and outlet length, of Stainless Steel tubing, cast in a tin or tin-bismuth alloy. Surrounding the inlet tubing with metal greatly enhances the heat transfer characteristics.

INJECTION OR SELECTION VALVE

The TL-105 column heater has been designed to accommodate an injection or switching valve in the heated compartment. This placement allows the entire flow path to be held at the same temperature. The placement of the valve in the oven also allows for upstream preheating. In upstream preheating the heat exchanger is placed between the pump and the injection valve eliminating extra column band broadening from the volume of the heat exchanger.

INSTALLATION

SETTING THE VOLTAGE

1. The TL-105 will operate at 110, 220, or 240V. Either 50 or 60-hertz power is acceptable. The set instrument voltage is recorded on sticker placed over the input receptacle. Confirm that the voltage selection pin on the input receptacle indicates the proper voltage. See VOLTAGE CONFIGURATION to change the voltage.
2. The power cord can be inserted once the proper voltage on the input module on the side panel has been set. The TL-105 is furnished with a US style 110V AC line cord. If 220 or 240V is to be used, acquire the proper power cord to conform to local protocol.

VOLTAGE CONFIGURATION

1. Remove the cover from the power entry module using a small blade screwdriver or similar tool.
2. Replace the power entry module cover and confirm that the voltage selection pin indicates the appropriate voltage. If the appropriate voltage is not selected change the voltage selection card orientation.

To change the voltage selection, pull voltage selection card straight out of power entry module housing using needle nose pliers. Using the indicator pin, orient the selector card so that the desired voltage is readable at the bottom of the card. Insert the voltage selector card into the housing, printed side facing towards the IEC connector, and edge containing the desired voltage first. See Figure 3.

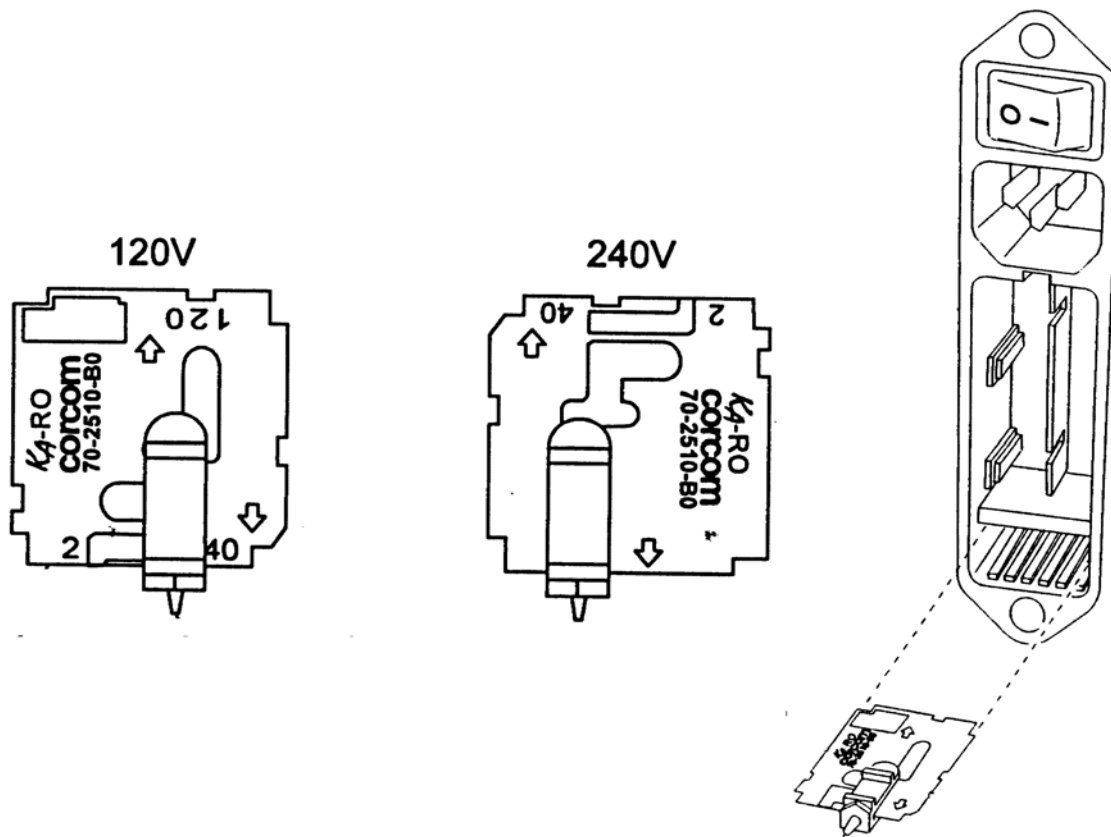


Figure 3: Voltage Configuration

3. Replace the power entry module cover and verify that the indicator pin shows the desired voltage.

INSTALLING AN INJECTION OR SWITCHING VALVE

The TL-105 is designed to accommodate the mounting of an injection or switching valve. Since the valve will reside in the same thermal environment as the heat exchanger and columns it is advised that the heat exchanger be plumbed into the system before the valve. Placing the heat exchanger before the injection valve will eliminate any extra column band broadening due to its volume.

1. Release the set screws on top of the oven and open the column compartment
2. Disconnect the heat exchanger from the bulkhead.
3. Remove the plate from the front panel of the TL-105 by releasing the 4 hex head screws.
4. Remove the handle from the valve and insert the shaft through the larger hole on the front panel plate. Secure it to the plate with the mounting screws. Replace the handle.
5. Position the plate on the front panel so that the valve goes through the hole in the column compartment.
6. Before securing the plate, reconnect the heat exchanger fitting and connect the column outlet tubing to the outlet bulkhead fitting on the inside of the plate.
7. Secure the plate to the front panel.
8. The injection valve vent/waste line should be routed out of the compartment through the hole in the left side of the case.

CONNECTING THE COLUMN

1. Connect the outlet of the manual or automated injection valve to the bulkhead labeled INLET. The other side of this bulkhead is attached to the heat exchanger.
2. Release the set screws on top of the oven and open the column compartment.
3. Attach the outlet of the heat exchanger to the inlet of the HPLC column or guard column.
4. Attach the outlet of the HPLC column to the bulkhead side of the labeled OUTLET that is in the oven faceplate.
5. Connect the bulkhead labeled OUTLET on the outside of the TL-105 to the HPLC detector or post column reagent module.

CONNECTING THE DRAIN

Any accidental leaks in the column compartment will drain from the back of the compartment to the bulkhead on the right side of the oven near the lower back corner. Some corrosive or harsh organic liquids are incompatible with the drain materials. Use caution to avoid leaks in the oven when using such liquids.

1. Connect a piece of tubing to the bulkhead using a nut and ferrule.
2. Direct the open end of the tubing to a waste reservoir.

3. OPERATING INSTRUCTIONS

SETTING THE TEMPERATURE

The lower red display on the digital controller is the set point. The set point can be adjusted with the two up/down arrow keys below the dual digital display. The upper green display is the actual temperature of the aluminum block at the center. The maximum set temperature is 100°C.

RED	Actual Temperature of Aluminum Block
GREEN	Set Point

The nominal warm up time for the TL-105 is 15-20 minutes. Generally the unit should be left on since the silicone heater is typically on a 10 - 30% duty cycle due to excellent insulation. Since the heater current is controlled by an oversized solid-state relay there is no wear on the parts in the TL-105.

4. APPENDIX

SPECIFICATIONS

Case Dimensions	8"W x 22½"L x 5"H
Heated Cavity Dimensions	3½"W x 20"L x 2¾"H
Inlet Pre heater	0.0625" OD x 0.010" ID x 30" SS coil cast in tin/bismuth alloy.
Heating Elements	Etched Foil/Silicon, 150W
Temperature Range	Ambient to 100°C
Temperature Stability	+/- 0.05°C
Operating Voltage	120 VAC or 240 VAC, selectable

ORDERING INFORMATION

Description	Catalog Number
TL-105 Column Heater, 120VAC	TL-105-120
TL-105 Column Heater, 240VAC	TL-105-240

ACCESSORIES

Description	Catalog Number
HX-101, Heat Exchanger	TL-HX

WARRANTY

Timberline Instruments, Inc. (Timberline) warrants its products and services to meet the written performance and quality and to be free of defects in material and workmanship. They are not warranted, nor does Timberline assume liability, if the buyer has misused the product in any manner, has failed to use the product in accordance with industry standards and practices, or has failed to use the product in accordance with instructions, if any, furnished by Timberline. Timberline's sole responsibility and the buyer's exclusive remedy with respect to the purchase of any product proved to Timberline satisfaction to be defective or nonconforming, is repair, replacement, or credit, in Timberline's sole discretion. No other warranty or representation is implied or expressed by Timberline for its products with respect to merchantability, fitness for a particular purpose or any other matter. Timberline shall not under any circumstances be liable for any incidental, consequential or compensatory damage arising from the use of, or in conjunction with its products, even if Timberline has been advised of the possibility of such damages. The maximum liability that can be assumed by Timberline for breach of warranty shall be the invoice price of the product. All claims must be brought within one (1) year of shipment, regardless of their nature.

Components that are subject to normal wear and/or are scheduled for routine replacement within the warranty period, and/or parts that are subjected to effects of corrosion or deterioration by chemical or other action are excluded from the above warranty. Repair or replacement will not be made under warranty for malfunction because of inadequate facilities, operating conditions or utilities.

Guarantees/Warranties on accessories and equipment included by Timberline from other manufacturers are limited to the guarantees given on such equipment by the respective manufacturers.

SHIPMENTS

All shipments are made F.O.B. Boulder, CO. Instruments and major components will be packed and shipped via surface, unless otherwise requested. Supplies and/or replacement parts are packed and shipped via UPS, UPS Blue, air parcel post, or parcel post, unless otherwise requested.

DAMAGED SHIPMENTS

The Interstate Commerce Commission has held that carriers are as responsible for concealed damage as for visible damage in transit. Unpack shipment promptly after receipt, as there may be concealed damage even though no evidence of it is apparent. When concealed damage is discovered, cease further unpacking of the unit involved and request immediate inspection by the local agent or carrier and secure a written report of the findings to support a claim. This request must be made within 15 days of receipt. Otherwise, the carrier will not honor the claim. Do not return damaged goods to the factory without first securing an inspection report and contacting Timberline for a return authorization number.

FILING OF CLAIMS

After a damage inspection report has been secured, Timberline will cooperate in supplying replacements and handling a claim that may be initiated by either party.

RETURNS

Timberline Instruments, Inc. tries to accommodate all requests for returns. Inspect shipment upon receipt and report shortages, incorrect or damaged materials to us immediately. Report shipping damage to the carrier. Damaged shipments must remain with the original packaging for freight company inspection. Products not supplied in accordance with your orders or products that are defective at the time you receive them are accepted for full credit. Products ordered in error are subject to a 15% restocking charge. Special or custom orders cannot be returned unless defective. All returned merchandise must be in unused, resalable condition, and must not consist of hazardous materials.

No returns will be accepted more than 90 days after shipment for any reason. Before 90 days, no returns will be accepted without prior authorization. If it is necessary to return a product to us, please contact our customer service department to obtain a return material authorization (RMA) and shipping instructions. When you call, be prepared to supply the information necessary for us to identify your order, including your company name, address, purchase order number/invoice number, shipping date, product description and catalog number. Write the RMA number on all shipping labels and correspondence about the shipment. Returns without this number will be returned to you collect. Be careful to address the shipment to the street address. Shipper will not deliver to our post office box numbers. We require that you prepay shipping costs; COD's will not be accepted. Returns must be made through a traceable carrier.

Shipment of authorized returns should be made within 30 days of the issuance of RMA. If products are not returned within the time limit, the RMA may expire. Timberline Instruments, Inc. reserves the right to refuse any return or credit after a RMA has expired.

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