



# Eldex

## **Eldex<sup>®</sup> Column Heater**

**Operator's Manual**

Eldex Laboratories, Inc.  
30 Executive Court  
Napa, CA 94558  
Tel: (707) 224-8800  
Fax: (707) 224-0688  
[www.eldex.com](http://www.eldex.com)



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# INTRODUCTION

## The Eldex Column Heater

Eldex column heaters are designed to provide the precise, controlled thermal environment necessary for reproducible qualitative and quantitative analysis in HPLC.

Up to four columns ranging from 10 to 30 cm long and from 1/4 to 1/2 inch OD are supported within a thermally insulated block by interchangeable aluminum inserts tailored to the column. Channels in the interior surface of the heater provide good thermal contact for inlet/outlet tubing to assure reproducible equilibration.

Temperatures from approximately 30°C (5 degrees above ambient) to 150°C are maintained within 0.1 degree by a precise adjustable control unit. A fail-safe circuit shuts off the power to the unit if the temperature exceeds approximately 155°C.

The flexible sealing of the heater assembly allows inlet and outlet tubing to be routed into the unit at any point in order to minimize tubing length and extra-column dead volume. For the optimum in reproducibility, an optional Rheodyne injection or switching valve may be mounted in thermal contact with the heater assembly.

## About This Manual

Section II of this manual describes the unpacking, location, and initial installation of the unit in your liquid chromatography system. Section III covers routine operation. Section IV covers maintenance and accessories. Section V covers warranty and return procedure.

## A Guided Tour of the Eldex Column Heater

The Eldex Column Heater consists of a Control Unit and a Heater Unit connected by a control cable. The power supply and all of the electronics are contained in the Control Unit where they are isolated from contact with solvents and mobile phase liquids.

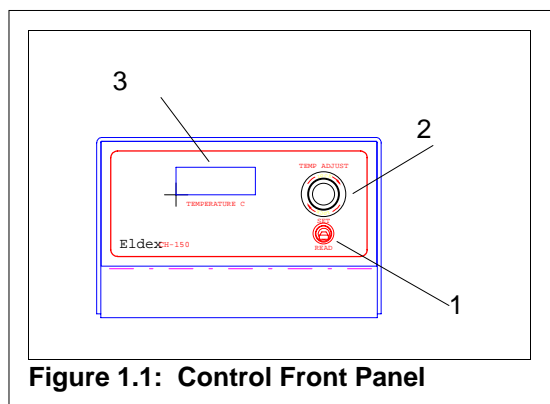


Figure 1.1: Control Front Panel

As you look at the front panel of the Control Unit (Figure 1.1), you will see:

- 1. Set/Read Switch** when in the READ position, selects display of the current temperature and when pressed upward to the SET position, the switch selects display of the temperature set point.
- 2. Temp Adjust Knob** changes the temperature set point. The outer locking collar may be turned clockwise to prevent inadvertent knob motion.
- 3. Temperature Display** shows the current temperature in degrees Celsius when the Set/Read Switch is in the READ position. When the Set/Read switch is pressed upward to the SET position, the display shows the current temperature set point.

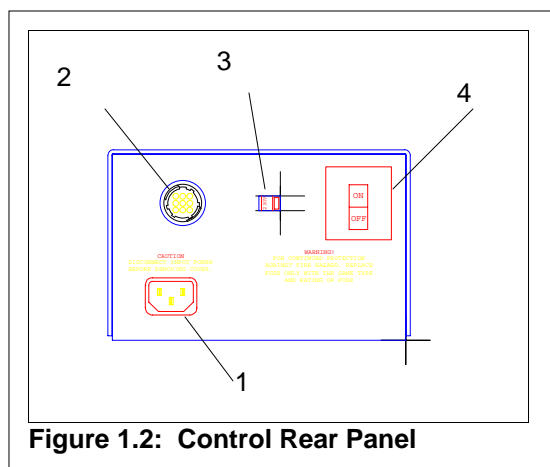
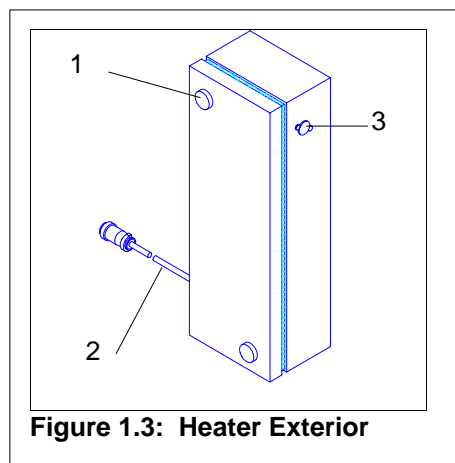


Figure 1.2: Control Rear Panel

The rear panel of the Control Unit (Figure 1.2) provides access to:

- 1. Power Connection** uses a standard 3-conductor modular power cord.
- 2. Control Cable Connection** mates with the Control Cable from the Heater Unit.
- 3. Voltage Select Switch** provides Selection of 115V or 230V 50/60Hz operation. The current voltage is displayed on the switch.
- 4. Power Switch** switches system power ON and OFF. The switch also incorporates a circuit breaker and “fail-safe” thermal runaway protection.

The Heater Unit (Figure 1.3) bears two sets on non-skid feet than enable to unit to be used in either a horizontal or vertical orientation.



**Figure 1.3: Heater Exterior**

**1. Retaining Knobs** hold the cover in place.

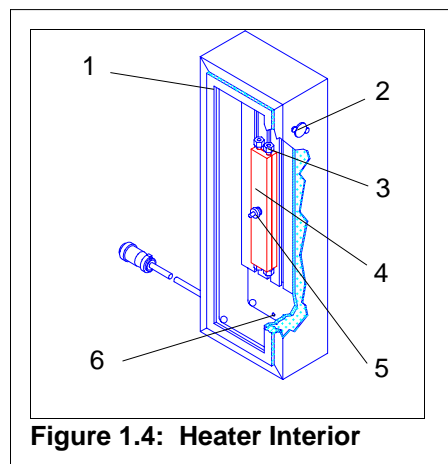
**2. Control Cable** connects the Heater Unit to the Control Unit.

**3. Valve Mounting Port** allows installation of a Rheodyne injector or switching valve.

The interior of the Heater Unit (Figure 1.4) contains the column inserts and provisions for mounting an injector or switching valve:

**1. Peripheral Seal** insulates the Heater Unit interior while providing the flexibility to route inlet/outlet tubing into the Heater at any point.

**2. Valve Mounting Port** allows installation of a Rheodyne injector or switching valve. When no valve



**Figure 1.4: Heater Interior**

is installed, the port is plugged with an O-ring, sealing plate, and spacer to maintain thermal insulation of the interior.

**3. Column Insert Mounting Tracks** allow one or two column inserts to be mounted in a variety of positions within the Heater Unit. Inlet/outlet tubing may also be routed through the tracks to provide thermal equilibration for the mobile phase.

**4. Column Inserts** each hold two columns. Inserts are available for column lengths from 10 to 30 cm and column diameters from 1/4 to 1/2 inch. Note that inserts are not provided with the unit and must be ordered separately.

**5. Column Insert Retaining Knob** clamps the columns within the column insert and the column insert to the mounting track.

**6. Drain Holes** allows any leaking solvent to drain from the interior of the unit.

## Specifications

**Electrical:** 2A @ 115 V 50/60 Hz or 1A @ 220 V 50/60 Hz (operating voltage switch-selectable)

**Tubing:** 1/16-inch OD tubing can be accommodated

**Columns:** 1 to 4

Length: 10 cm to 30 cm

Diameter: 1/4 to 1/2 inch OD

**Dimensions:** (w x d x h)

Heater: 6.5" x 4.5" x 18" (16.5cm x 11.4cm x 45.7cm)

Controller: 6.5" x 9.5" x 4.25" (16.5cm x 24.1cm x 10.8cm)

### Weight

Heater: 10.5 lbs. (4.8 kg)

Controller: 3.9 lbs. (1.8 kg)

### Temperature:

Maximum: 150°C

Minimum: 5°C above ambient

Resolution: 1°C steps

Precision: 0.1°C

**Temperature Readout:** 3-digit liquid crystal display

### Readout:

**Thermal Protection:** Thermal cutoff at approximately 155°C; Reset using power switch.

**Valves:** Pre-drilled to accommodate most Rheodyne 7xxx series injectors/switching valves.

# INSTALLATION

## What You Will Need

### The Unit

The Eldex Column Heater as shipped consists of two units: the Heater Unit itself and the Control Unit.

### Column Inserts

In addition to the Heater Unit and Control Unit, you should use one or more column inserts of appropriate size to fit your columns. The inserts are not provided with the unit, you must order them separately. Column inserts are available to accommodate column lengths from 10 to 30 cm and column outside diameters from 1/4" to 1/2". A list of column inserts available and their part numbers is provided in Section IV.

Cartridge columns or columns larger than 1/2" OD can be accommodated in the Heater Unit, but cannot be fastened.

### Tools

No tools are needed for routine use of the column heater itself. For installation, you will need a set of wrenches to accommodate the columns and fittings. The sizes will obviously depend on the specific columns and fittings used. In general, 1/4", 5/16", 1/2", and 5/8" open-end wrenches will serve for most applications.

In addition, if you plan to install a Rheodyne injector or switching valve in the Heater Unit, you will need:

- A pair of long-nose pliers and a thin standard screwdriver used to remove the O-ring and plug from the Heater Unit.
- A 1/4" open-end wrench (provided with the valve) used to connect the valve fittings.
- A 5/64" hex wrench ("Allen wrench"); provided with the valve) used to remove and re-install the valve handle.
- Two 8-32 screws (provided with the valve) used to mount the valve to the Heater Unit.
- A standard screwdriver to fit the mounting screws.

### Unpacking

The Heater Unit and the Control Unit along with the power cord, control cable, and necessary accessories are shipped in the same box. Before attempting to operate the Column Heater, unpack it carefully. Do not discard any packing material until you have carefully checked the Column Heater for damage. If any damage is evident, you should contact the freight company that delivered the unit to file a claim.

### Location

The Eldex Column Heater can be used in either a vertical or horizontal orientation. When used in a vertical orientation, the Heater Unit requires approximately 7 inches by 5 inches of bench space. When used horizontally, the Heater Unit requires approximately 7 inches by 19 inches of bench space. The Control Unit may be located up to 4 feet away from the Heater Unit.

The Column Heater should be used in a well-ventilated environment free of corrosive or explosive vapors.

For best chromatographic performance, the Column Heater should be located as close as possible to the detector and to any external injection valve in order to minimize extra-column dead volume caused by connecting tubing.

### Electrical Connections

The Control Cable is "hard-wired" to the Column Heater Unit. The end of the cable should be connected to the appropriate receptacle on the rear panel of the Control Unit. The connector is keyed so that it can only fit one way; you may have to rotate the connector in order to find the correct orientation. Be careful not to force-fit the connector. When the pins have engaged, turn the retaining collar one full turn clockwise to lock the connector securely in place.

Before connecting the power cord, check that the voltage input is properly set for the conditions you will be using (either 115 or 230 VAC). The voltage is indicated on the voltage selector switch located in the center of the rear panel. If the voltage is not correctly set, move the switch to the correct position.

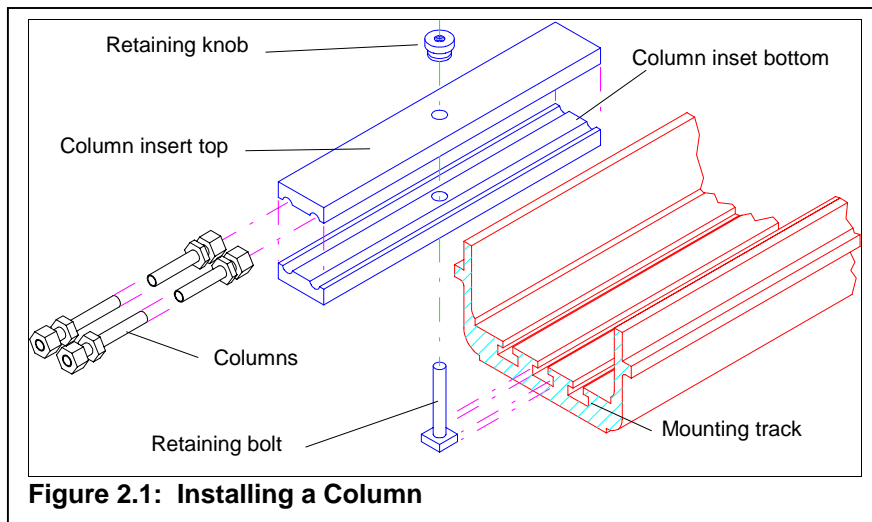
Plug the modular power cord into the receptacle on the lower left rear panel of the Column Heater.

## Installing a Column

Access to the interior of the Heater Unit is obtained by unscrewing the two retaining knobs on the cover of the unit.

Columns are installed in the Heater Unit in Column Inserts which provide secure mechanical mounting and good thermal contact between the inner wall of the heater and the column itself. Column Inserts are not provided with the unit; they must be ordered separately to fit the columns you will be using. A list of available column inserts is provided in Section IV. Each insert holds two columns.

Cartridge columns or columns larger than 1/2" OD can be accommodated by the Heater Unit, but they cannot be fastened.



The Heater Unit has room for two column inserts side by side, with the center mounting track free for routing tubing to allow mobile phase preheating.

Each column insert consists of four parts (Figure 2.1): a retaining bolt, two insert halves, and a retaining knob.

To install columns in the Heater Unit, slip the retaining bolt into one of the tracks, then place one of the insert halves over the bolt with the semicircular grooves facing out. Place the columns to be used in the grooves, then place the second half

of the insert over the columns with the grooves facing in. Screw the retaining knob onto the protruding end of the bolt and fasten finger-tight to securely retain the columns.

To move the columns vertically within a given track, loosen the retaining knob, then slide the column to the desired location. To move columns to a different track, remove the column and insert assembly and re-install in the new track.

## Liquid Connections

Tubing connections to the columns themselves are done in the usual fashion. The following procedure is typical for the “male nut” or “compression screw” fitting found on many commercial HPLC columns. Because the exact design of the fittings used differs from manufacturer to manufacturer, you should consult the manual for your specific column for details on its connection.

In general, inlet/outlet connections are made with 1/16" OD stainless steel tubing. For minimum dead volume, the ID of the connecting tubing should be as small as possible (0.010" is typical). The end of the tubing should be cut off square and ground flat, then deburred to ensure that the interior is not crimped so as to obstruct the liquid flow. Slip the compression screw and ferrule over the end of the tubing. Insert the tubing into the column end fitting. Make sure that the end of the tubing “bottoms” firmly in the fitting. Hold the column end fitting steady with a 1/2" open-end wrench while you use a 1/4" open-end wrench to tighten the fitting 1/4-turn past “finger-tight”.

Tubing may be routed into the Heater Unit at any point along the periphery; the foam seal will flex to accommodate it.

If “preheating” of the mobile phase is desired, the tubing may be routed down the center of an unused mounting track.

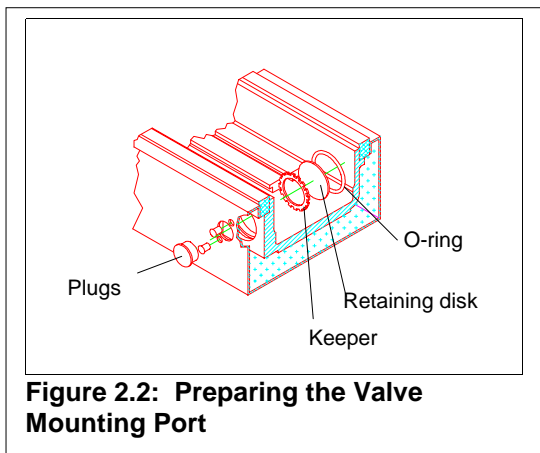
Replace the Heater Unit cover and fasten in place with the retaining knobs.

## Installing a Valve

The Heater Unit is provided with a mounting port to fit a standard Rheodyne injector or switching valve. When an injector is mounted, the interior of the Heater Unit can accommodate sample loops up to 500  $\mu$ L without the need to bend tubing. Larger loops can be accommodated by bending the loop.

The valve installation procedure is illustrated in Figures 2.2 and 2.3.

Use a pair of long-nose pliers to gently pull the O-ring out of the groove in the periphery of the mounting port in the inner



**Figure 2.2: Preparing the Valve Mounting Port**

loosen the two valve handle setscrews (located on the shaft of the valve handle) and remove the handle.

Lubricate the O-ring lightly with petroleum jelly or soap and re-insert it in the groove, then insert the valve through the port and fasten to the outer wall with the two 8-32 screws provided with the valve.

Finally, replace and tighten the valve handle, and route the connecting tubing as necessary to the column, pump, detector, etc.

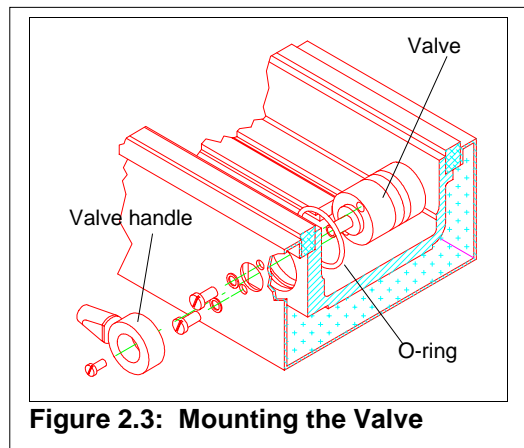
Replace the Heater Unit cover and fasten in place with the retaining knobs.

wall of the Heater Unit. When the O-ring is removed, the retaining disk should simply fall out (if the disk slips and wedges in the groove, you may have to pick up the heater unit and shake it to dislodge the disk).

After the disk has been removed, pull out the “keeper”. Push any exposed fiberglass insulation aside and use a screwdriver to push the three plastic plugs out of the outer wall of the Heater Unit.

Because the clearance between the valve and the walls of the Heater Unit will be limited, we suggest that all tubing connections to the valve be made before the valve is inserted into the mounting port. Follow the instructions that came with the valve.

Use the hex wrench provided with the valve to



**Figure 2.3: Mounting the Valve**

## OPERATION

### Setting the Temperature

On the Front Panel of the Control Unit, unlock the Temp Adj knob by turning the locking collar fully (1/6 turn) counterclockwise. Press the Set/Read switch upward to the SET position and hold it there while turning the Temp Adj knob until the desired temperature is displayed. Release the Set/Read switch and turn the locking collar on the Temp Adj knob fully (1/6 turn) clockwise to lock the temperature setting. The display will show the actual temperature inside the Heater Unit.

If the temperature display reads “-1”, the Control Cable is probably not connected or is connected improperly.

Temperatures may be set from 0 to 150°Celsius. Operation with the specified precision requires a temperature setting at least 5°C above ambient temperature.

In case of controller problems resulting in a “thermal runaway”, a “fail-safe” circuit shuts off all power to the system at 155 ±3°C as the heater draws sufficient current to trip the circuit breaker incorporated in the ON/OFF switch.

### Changing a Column

**CAUTION:** the heater can be HOT! Use gloves or allow the unit to cool to ambient temperature before opening.

Access to the interior of the Heater Unit is obtained by unscrewing the two retaining knobs on the cover of the unit.

Disconnect the inlet and outlet tubing connection from the column. Loosen the Column Insert Retaining Knob and unscrew it completely from the Retaining Bolt. Lift off the top half of the column insert and remove the old column. Place the new column in the empty groove, then replace the top half of the insert with the grooves facing in. Screw the retaining knob onto the protruding end of the bolt and fasten finger-tight to securely retain the column. Re-connect the column inlet and outlet lines.

To move the columns vertically within a given track, loosen the retaining knob, then slid the column to the desired location. To move columns to a different track, remove the column and insert assembly and re-install in the new track.

Replace the Heater Unit cover and fasten in place with the retaining knobs.



# MAINTENANCE AND ACCESSORIES

## Maintenance

The simple rugged design of the Eldex Column Heater results in a unit that requires no routine service or maintenance.

The Eldex Column Heater has no user-serviceable components. In case of failure, contact Eldex Laboratories or your Eldex representative for assistance.

## Accessories

Part No.	Description
1234	Insert for two 1/4" x 10 cm columns
1235	Insert for two 1/4" x 15 cm columns
1236	Insert for two 1/4" x 25 cm columns
1237	Insert for two 1/4" x 30 cm columns
1238	Insert for two 3/8" x 10 cm columns
1239	Insert for two 3/8" x 22 cm columns
1240	Insert for two 3/8" x 30 cm columns
1241	Insert for two 1/2" x 25 cm columns

## APPENDIX

### Warranty

Eldex Column Heaters are guaranteed against failure due to manufacturing defects for 12 months from the date of shipment. Both parts and labor are covered under the warranty. The warranty does not apply when there has been obvious misuse or mistreatment by the user, when damage has been caused by attempted repairs by unauthorized personnel, or when the unit has been exposed to corrosive or other inappropriate chemicals.

### Return Procedure

To return an instrument for repair, contact our factory at (800)969-3533 or (707)224-8800 to obtain authorization. Describe the problem with the instrument to our factory personnel and receive a Return Authorization Number. Reference the number on the outside of the packing box in which you return the instrument. Also reference the Return Authorization Number on any paperwork you send with the unit. Be sure to enclose a brief note describing the problems, reference the serial number of the unit, and describe any chemicals used. Also reference your return address. Send the instrument freight prepaid to:

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30 Executive Ct.  
Napa, CA 94558-6278

### Trademarks

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Eldex reserves the right to incorporate improvements and alter construction details without notice.





