BP-CO COLUMN OVEN

INSTRUCTION MANUAL

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Benson Polymeric Model BP-CO Column Oven
Instruction Manual

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BP-CO FEATURES

PRINCIPLE OF OPERATION

The Benson Polymeric BP-CO Column Oven provides temperature control with a stability of ±0.1°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 polyurethane thermal insulation (107°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 ion exchange efficiency
- Lower backpressures by 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 controller sensor is a 100-ohm RTD probe inserted into a 0.16" hole in the aluminum block. The RTD probe is placed 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 manually reset when an over temperature condition opens the heater circuit. Contact Benson Polymeric for instructions.

ELECTRICAL FUSE PROTECTION

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

INJECTION OR SELECTION VALVE

The BP-CO Column Oven 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 pre-column heater should be placed before the injection valve, further enhancing column efficiency.

MOBILE PHASE HEAT EXCHANGER

When not using an injection or switching valve in the heated compartment, the BP-CO Column Oven may be purchased with an optional pre-column heat exchanger (part # 5050-0). This passive device transfers heat from 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 then it is in the center. This will result in lower retention and viscosity near the tube wall causing peak broadening and splitting.

Figure 1: BP-PH Pre-Column Heater.

The BP-PH pre-column heater is 8" of Stainless Steel 0.01 ID Tubing encased in aluminum which greatly enhances the heat transfer characteristics.

WITHOUT INJECTION VALVE OR PRE-COLUMN HEATER

Although we recommend using a Injection Valve or Pre-Column heat exchanger installed in the oven compartment for optimal column efficiency, the oven can be operated without either device. In order to aid column efficiency, use at least 300mm of 1/16” PEEK or stainless steel tubing inside of the oven to connect the inlet end of the column to aid sample pre-heating. Use the shortest possible 1/16” tubing from the outlet end of the column to the detector to reduce band broadening.

INSTALLATION

1. The BP-CO will operate at 110, 220, or 240V (must be specified when ordering). Either 50 or 60-hertz power is acceptable. The set instrument voltage is shown on the input receptacle.

2. The BP-CO 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.

INSTALLING AN INJECTION OR SWITCHING VALVE

The BP-CO 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 BP-PH pre-heater be plumbed into the system before the valve. Placing the pre-heater 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. Remove the handle from the injection 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.
3. The injection valve vent/waste lines should be routed out of the compartment through the hole in the left side of the case.

CONNECTING THE COLUMN WITH INJECTION VALVE INSTALLED (Figure 2)

1. Release the set screws on top of the oven and open the column compartment.
2. Attach one end of the BP-PH Pre-Column Heater to the inlet of the manual or automated injection valve.
3. Attach the other end of the pre-column heater to the analytical pump with PEEK or stainless steel tubing, routing the line through the openings in the front of the cabinet.
4. Attach PEEK or stainless steel tubing from the outlet of the injection valve to the inlet of your guard/analytical HPLC column.
5. Attach the outlet of the HPLC column with PEEK or stainless steel tubing through the openings in the front of the cabinet to the detector.
6. Replace the cover on the oven.

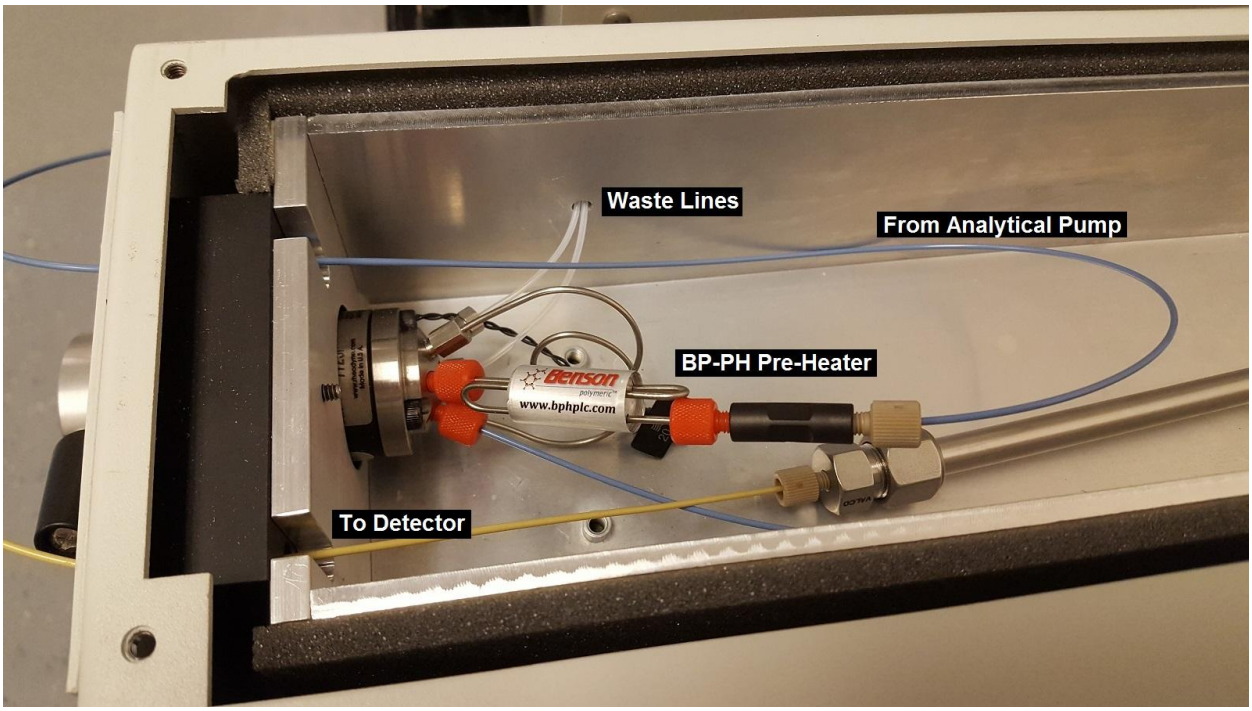

Figure 2: Oven Configuration with Installed Injection Valve.

CONNECTING THE COLUMN WITHOUT INJECTION VALVE INSTALLED (Figure 3)

1. Release the set screws on top of the oven and open the column compartment.
2. Attach one end of the BP-PH Pre-Column Heater to the inlet of the HPLC column.
3. Attach the other end of the pre-column heater to the analytical pump with PEEK or stainless steel tubing, routing the line through the openings in the front of the cabinet.
4. Attach the outlet of the HPLC column with PEEK or stainless steel tubing through the openings in the front of the cabinet to the detector.
5. Replace the cover on the oven.

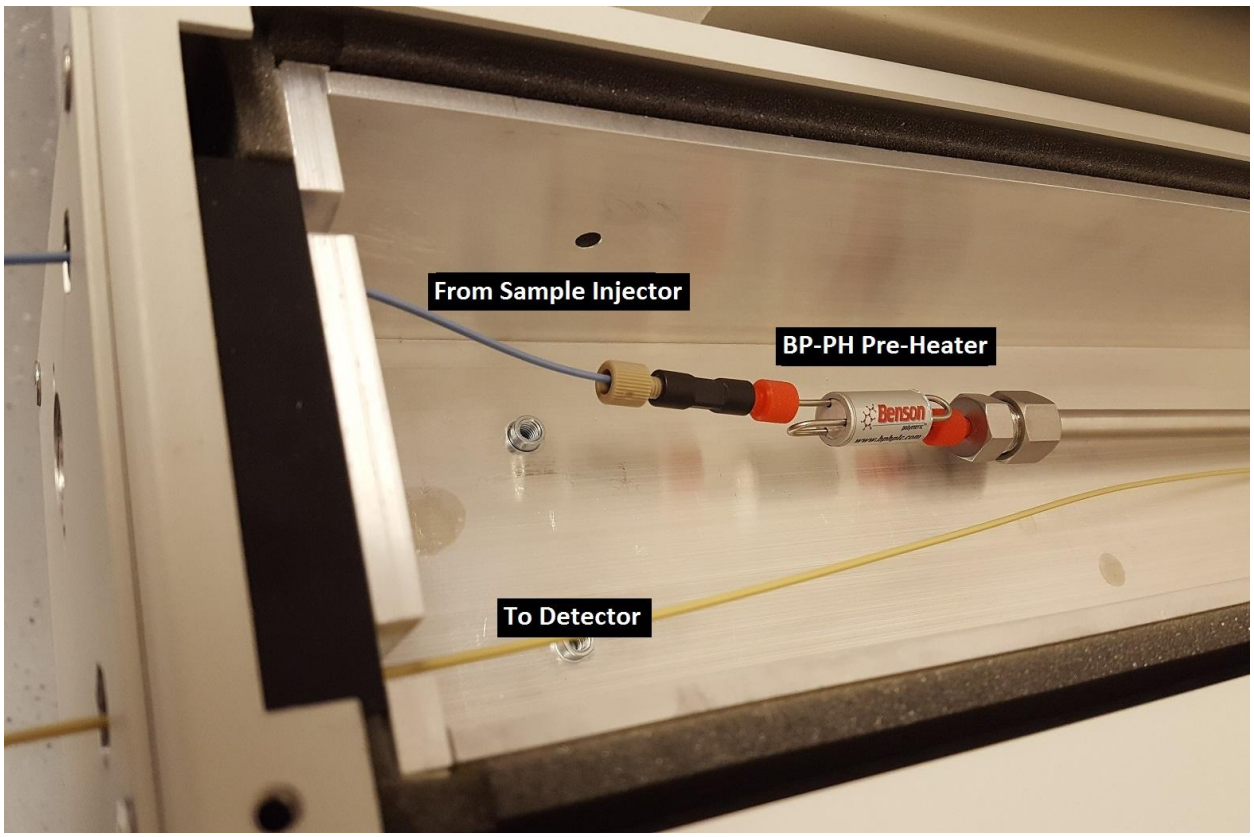

Figure 3: Oven Configuration without Installed Injection Valve.

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.

OPERATING INSTRUCTIONS

SETTING THE TEMPERATURE

The lower green 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 red display is the actual temperature of the aluminum block at the center. The maximum set temperature for a standard BP-CO is 100°C.

RED	Actual Temperature of Aluminum Block
GREEN	Set Point

The nominal warm up time for the BP-CO 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 BP-CO.

APPENDIX

SPECIFICATIONS

Case Dimensions BP-CO	8.00"W x 25.50"L x 5.00"H
Heated Cavity Dimensions BP-CO	3.50"W x 23.00"L x 2.75"H
Pre-Column Heater BP-PH	8" SS 0.01 ID Tubing
Heating Elements	Etched Foil/Silicon, 150W
Temperature Range BP-CO	Ambient + 5°C to 100°C
Temperature Stability	+/- 0.1^{o}C
Operating Voltage	120 VAC or 240 VAC

ORDERING INFORMATION

Description	Catalog Number
BP-CO Column Oven, 120VAC	5060-0
BP-CO Column Oven, 240VAC	5060-2

ACCESSORIES

Description	Catalog Number
BP-PH Pre-Column Heater, 8" SS 0.01 ID Tubing	5050-0
BP-CO Accessory Kit	5050-2

WARRANTY

Benson Polymeric, Inc. (Benson) 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 Benson 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 Benson. Benson’s sole responsibility and the buyer’s exclusive remedy with respect to the purchase of any product proved to Benson's satisfaction to be defective or nonconforming, is repair, replacement, or credit, in Benson’s sole discretion. No other warranty or representation is implied or expressed by Benson for its products with respect to merchantability, fitness for a particular purpose or any other matter. Benson 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 Benson has been advised of the possibility of such damages. The maximum liability that

can be assumed by Benson 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 Benson from other manufacturers are limited to the guarantees given on such equipment by the respective manufacturers.

SHIPMENTS

All shipments are made F.O.B. Reno, NV. 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 Benson Polymeric Inc. for a return authorization number.

FILING OF CLAIMS

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

RETURNS

Benson Polymeric, 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 then 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. Benson Polymeric, Inc. reserves the right to refuse any return or credit after a RMA has expired.