



GENERAL

The **SF-28** solution heater is designed for use with Warner's **TC-324** and **TC-344** Heater Controllers. The compact design of this heater allows it to be installed immediately adjacent to the input port of a chamber, insuring minimum heat loss.

TUBING CONNECTIONS

PE-160 tubing (or any other tubing with a 1/16" (1.5 mm) OD) is used to connect the **SF-28** to both the solution reservoir and perfusion chamber. In general, attach the PE tubing to the **SF-28** using a short bridge of Tygon® tubing.

OPERATION

1. Attach a flow line from your solution reservoir to the input port of the **SF-28** using **PE-160** tubing.
2. Attach a flow line from the output port of the inline heater to your perfusion chamber using **PE-160** tubing.

NOTE: When connecting the **SF-28** to the perfusion chamber, minimize the PE tubing length between the **SF-28** and the chamber to optimize the heater's performance.

3. Place the outflow tubing of the perfusion chamber into a collection reservoir.
4. Connect the power cable of the **SF-28** to the output terminal of the heater controller.
5. Connect the **TA-29** thermistor cable assembly to the rear panel (T2 Monitor) input of the heater channel being used.
6. Set the flow rate to the desired level and turn the power to the heater controller on.

Note: Typical flow rates are 2 ml/min or less and the heater can sustain temperatures up to 50°C under these conditions. The heater can support faster flow rates but the output temperature will not be well maintained at the set temperature. Refer to the instructions included with the controller to adjust temperature.

7. Place the **TA-29** thermistor in the output flow from the heater and read the temperature of the solution by selecting T2 on the heater controller. The solution temperature should read within a degree or two of the set temperature.

USING WITH A CHAMBER

1. Place a thermistor (such as the **TA-29**) into the bath to measure the its temperature. Adjust the voltage on the power supply to compensate for heat lost between the heater to the bath.
2. Additional adjustment of the heater voltage may be required if any of the following change substantially during the experiment. Efforts to minimize these factors will be rewarded.
 - Solution flow rate
 - Temperature of solution to the heater input
 - Ambient (room) temperature
 - Air currents around chamber

OUTGASSING

A common problem with rapid heating of solutions is that of outgassing. The bubbles formed can often cause blockages or disruptions to the flow in the chamber bath. When this occurs, effective resolution of the problem is to pre-warm the perfusate at the reservoir.

MAINTENANCE

Salt solutions can be very corrosive and can shorten heater life if left in the heater when not in use. The heater should be flushed with distilled water and blown dry after each use to eliminate the effects of moisture while in storage.

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