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## Laboratory Heating Mantles Operation Manual

### Safety Information

Your Heating Mantle is designed with function, reliability, and safety in mind. It is the user's responsibility to install it in conformance with local electrical codes.

### Warnings

#### To avoid electrical shock, always:

- Use an electrical outlet that operates with a fuse or a circuit breaker. Use of a ground fault interrupt circuit (GFCI) equipped circuit is recommended for additional protection.
- Disconnect the mantle from the power supply prior to maintenance and servicing.

#### To avoid personal injury:

- Do not use in the presence of flammable or combustible materials, fire or explosion may result. This device contains components which may ignite such materials.
- Do not operate in damp or wet locations.
- Refer servicing to qualified personnel only.
- Flasks and vessels should be handled with care. Appropriate safety clothing, glasses, gloves, and coats should be worn when operating all heating mantles.

### Operation

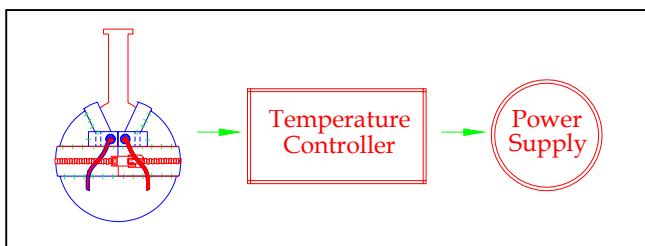
Your Heating Mantle is a Fiberglass-insulated heater designed for heating laboratory vessels. The mantles are specifically designed for use with glass flasks, however, with appropriate temperature control and product type, metal or plastic flasks could be used. Only round bottom flasks of the size corresponding to the mantle size should be used.

Spherical and hemispherical mantles should be used with properly sized supports. The manufacturer does not assume responsibility for mantles damaged as a result of inadequate support.

### Caution

#### To avoid damage to the heating mantle:

- Never plug directly into a power source. Your heating mantle MUST be operated with a temperature controller and with an appropriate size flask, filled with fluid.
- Never operate heating mantle without fluid within the flask.
- Fluid should not be allowed to come in contact with the cavity of the heating mantle.
- Never operate the mantle at temperatures above 450°C (842°F).



Once the mantle has been properly setup, plug the mantle into an acceptable temperature controller. The use of a variable transformer, other manual control, or an automatic controller is recommended to prevent overheating by controlling the temperature.

### Special Instructions for Spherical or Hemispherical Mantles with multiple circuit

The 1- and 2-liter spherical mantles have two circuits – one in the lower half and one in the upper half. Each circuit should be controlled with a suitable control device. The lower half’s circuit furnishes heat for boiling the liquid contents, while the upper half’s circuit prevents condensation of the vapors. It may often be necessary to operate the upper half’s circuit at no more than 50% of full power. For low boiling liquids, the upper half’s circuit need not be used. This will prevent superheating of the vapors, and overheating of the mantle’s circuits.

The 12-liter hemispherical (bottom half) mantle also has two circuits. When a flask is more than half full of liquids both circuits may be operated at the rated voltage. When the liquid level falls below the halfway mark in the flask, power to the upper circuit of the mantle should be reduced to 50% or less. This will prevent superheating of the vapors, and overheating of the mantle’s circuits.

### Bake-out Procedure for New Heating Mantles

On the initial heat-up of the mantles, a slight odor may be detected and some discoloration will occur in the cavity area. The discoloration of the cavity area has no effect on the operation of the mantle. If the heated vessel becomes discolored, it can be cleaned with water. To bake-out your mantle prior to use, connect the mantle to your temperature controller and fill a flask corresponding to the size of the mantle half full of water. Place the flask in the mantle cavity and allow the water to come to a boil and continue boiling for approximately 15 minutes. The mantle can be operated at full rated voltage during bake-out.

### Maintenance and Servicing

Your Heating Mantle is designed to provide a long and efficient service life. Overheating, contamination, and misuse will greatly reduce the life of the mantle.

If the flask or vessel breaks or fluid spills into the cavity, immediately disconnect the mantle from the power source. The mantle should be returned to the factory for evaluation, repair or replacement.

### Troubleshooting Tips

The troubleshooting tips are intended to aid you in defining and correcting possible service problems.

Problem	Possible Cause	Corrective Action
Heating Mantle does not heat	Not connected to power supply	Check Mantle connection
	No Power in circuit	Check power supply circuit
	Defective Control	Repair or replace Control
	Element burned out	Replace Mantle
Heating Mantle outgasses	Has not been baked-out	Refer to Bake-Out Procedure for new mantles
	Spillage of fluid	Disconnect from power supply and allow mantle to dry out completely before use.