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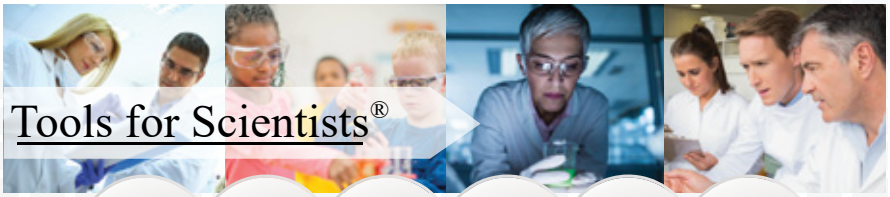

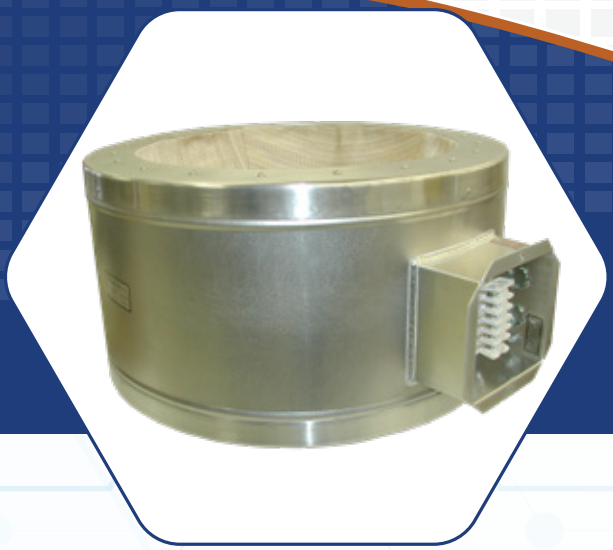

User Instructions

Some Precautions and Recommendations for the Handling and Heating of Large Glass Vessels

HANDLING:

1.) Do not wash flask with abrasive materials such as sand, abrasive powders, etc. These will make minute surface scratches which can develop into cracks.

2.) Do not place flask on a concrete floor, no matter how gently. The flask should always be placed in a soft support. Accidental bumps and blows can cause strains to develop.

3.) Flasks are sometimes broken by a stirrer falling out of the chuck. Makeshift stirring devices should be avoided. Only stirring equipment of proven design should be used.

INSTALLING:

1.) Carefully place the flask in the mantle.

2.) Fill the flask to the top with water and allow to rest in the mantle for several hours before attaching equipment to flask (overnight is preferable).

3.) Before attaching column, push down on flask to aid in seating the vessel mantle.

4.) Connect and readjust the column, bellows and other flask attachments to avoid tension or pressure on flask tubulations.

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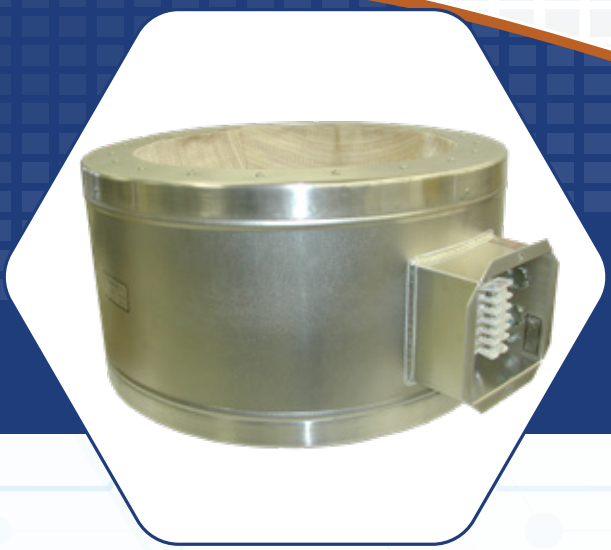

User Instructions

Some Precautions and Recommendations for the Handling and Heating of Large Glass Vessels

HEATING:

1.) When a fractionation or distillation is being taken nearly to dryness in a large flask, zoned heating must be employed. As the liquid level recedes below the half full point in the flask, the power input to the upper zones in the heating mantle must be reduced or shut off entirely in order to prevent super-heating of the bare wall above the liquid level. Heavy heat input should be applied only to a surface which has liquid adjacent to it on the other side. Controls (variable transformers or automatic devices) should be used to reduce the heat in the bottom zone when the liquid level is low.

2.) If very high boiling residues remain toward the end of a fractionation and it is necessary to distill them, this should not be done in flasks of 72-liters and larger. THE DISTILLATION OF HIGH BOILING RESIDUES SHOULD NOT BE CONTINUED WHEN THE LIQUID REMAINING IN THE LARGE FLASK IS LESS THAN ABOUT FIVE PERCENT OF ITS CAPACITY. The high boiling residues should be transferred to a smaller flask for distillation and dryness.

3.) If distillation is being conducted under vacuum in a large flask, a Poncho Safety Shield can be used to protect the flask from falling objects. Flasks are especially sensitive to small blows when under vacuum.

4.) At the end of a high vacuum distillation, air should not be let into the flask while it is still hot because explosive mixtures with the hot vapor can form.

(Heating - Continued to page 3)

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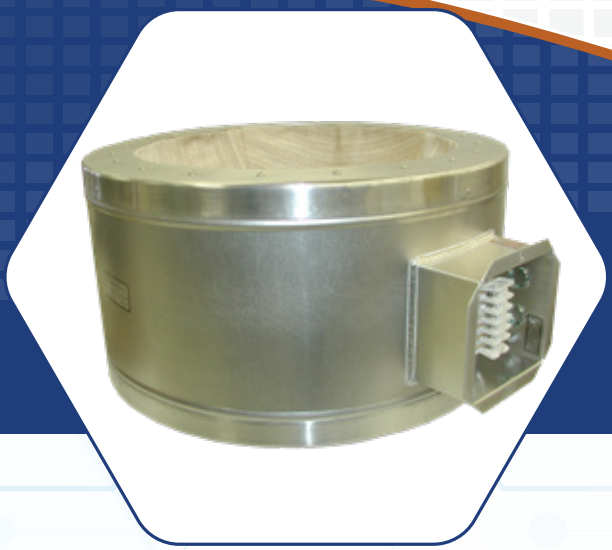

User Instructions

Some Precautions and Recommendations for the Handling and Heating of Large Glass Vessels

HEATING (Continued):

5.) If a liquid containing a large amount of suspended solids is being heated in a large flask, care should be taken to prevent the formation of a mud or sludge at the bottom of the flask due to settling of the solids. IF THIS IS UNAVOIDABLE, THEN THE BOTTOM HEATING CIRCUIT SHOULD NOT BE USED.

6.) In some operations a batch of material is heated in a flask and then removed through a bottom outlet. The flask should not be emptied immediately after the heating has ceased because there is enough stored heat in the mantle to make the bottom half of the flask hot and dry. Drops of condensate remaining in the top half of the flask can then coalesce and fall to the bottom hot area and cause cracking from severe thermal shock. THE FLASK SHOULD BE ALLOWED TO REST IN THE MANTLE FOR THIRTY MINUTES BEFORE EMPTYING while purging the mantle with air.

Heating Mantles, Installation and Operation

Caution: Custom heating mantles are designed and constructed for specific purposes and to fit specific objects or vessels. A mantle should not be used for an alternate purpose without consulting Glas-Col. Use of a mantle for an alternative purpose or alteration of mantle construction features, may cause unsatisfactory performance and the warranty to be voided.

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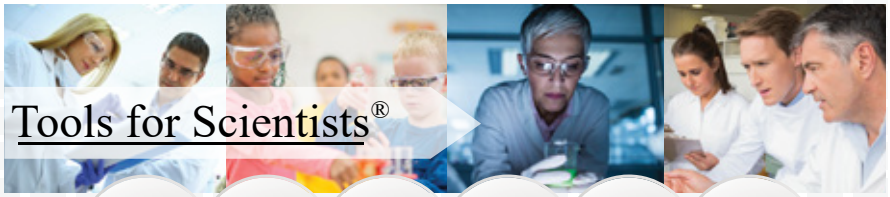

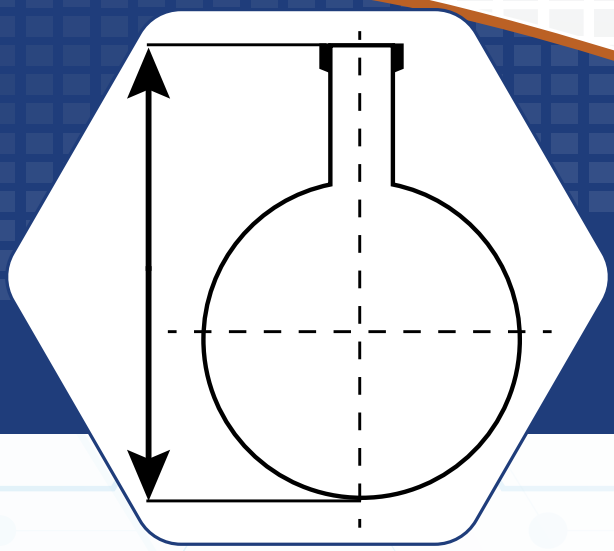

User Instructions

Heating Mantles, Installation and Operation

Unless specifically designated otherwise, Glas-Col custom heating mantles are not intended for use with flammables or in hazardous areas.

Assembly: **Details or instructions for assembly of Glas-Col custom heating mantles are not required since the assembly is completed at the factory.**

Installation: **Most Glas-Col custom heating mantle installations are effected by loosening the closure (if any) and applying the mantle from the top, bottom or side depending on the nature of the object to be heated. The closure should be fastened after installation so that the mantle fits the object snugly.**

Operation: **Glas-Col mantle operation requires Manual or Automatic temperature control to maintain the desired temperature and to prevent overheating of the mantle, the vessel and its contents. Low-temperature (type GF) mantles should not be operated above 400°C (752°F). High-temperature (type QF) mantles should not be operated above 600°C (1112°F). Automatic and manual controls are available from Glas-Col. See below for typical wiring diagrams. Call the factory if assistance is needed in selecting the proper temperature control.**

Maintenance: **Glas-Col mantles do not require regularly scheduled maintenance. However, regular inspection is recommended, and damaged mantles should be removed from service immediately. Glas-Col mantles should be protected from chemical spillage, mechanical damage and corrosive atmospheres so far as possible.**

Spare Parts: **Spare parts for Glas-Col heating mantles are not generally available with the exception of fastener components, electrical connectors and cord sets. To stock other spare parts, a complete spare mantle is usually necessary.**

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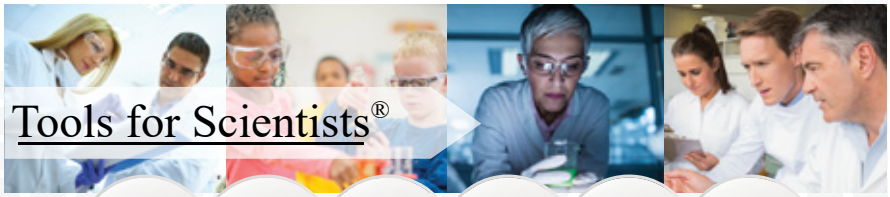


User Instructions

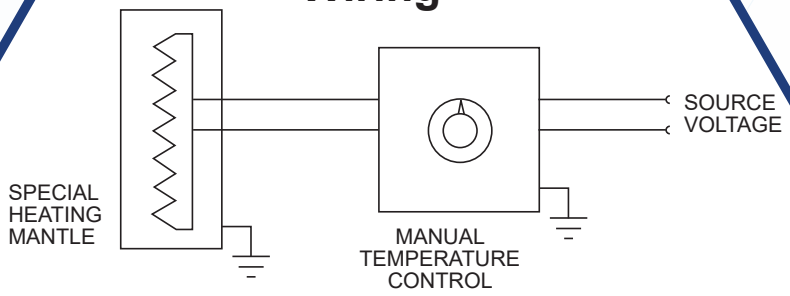
Heating Mantles, Installation and Operation

If your heating process requires basic control or several steps, Glas-Col has the control for you. We offer bench-top or custom designed industrial systems with features like Ramp/Soak that allows up to a 40-step profile. You can profile Temperature, Time, Hold, Soak and End steps to create the ideal profile for your process. The built in adaptive control technology provides even tighter control for these demanding applications. Several input types are available.

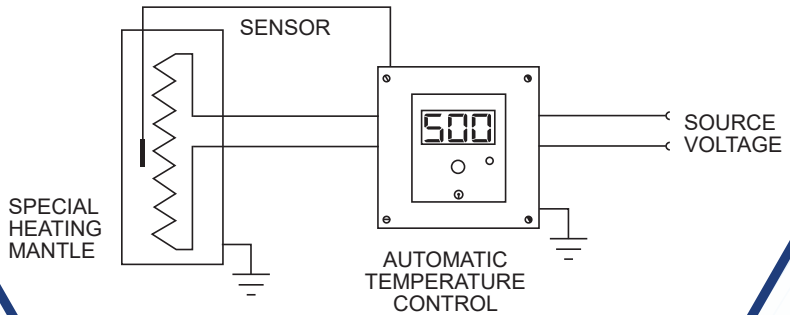
Limited Warranty:

See the current Glas-Col warranty policy located under the General Sales Policy on the Glas-Col website at www.glascol.com.

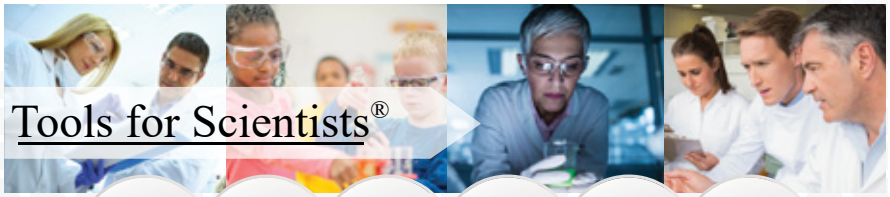
Wiring



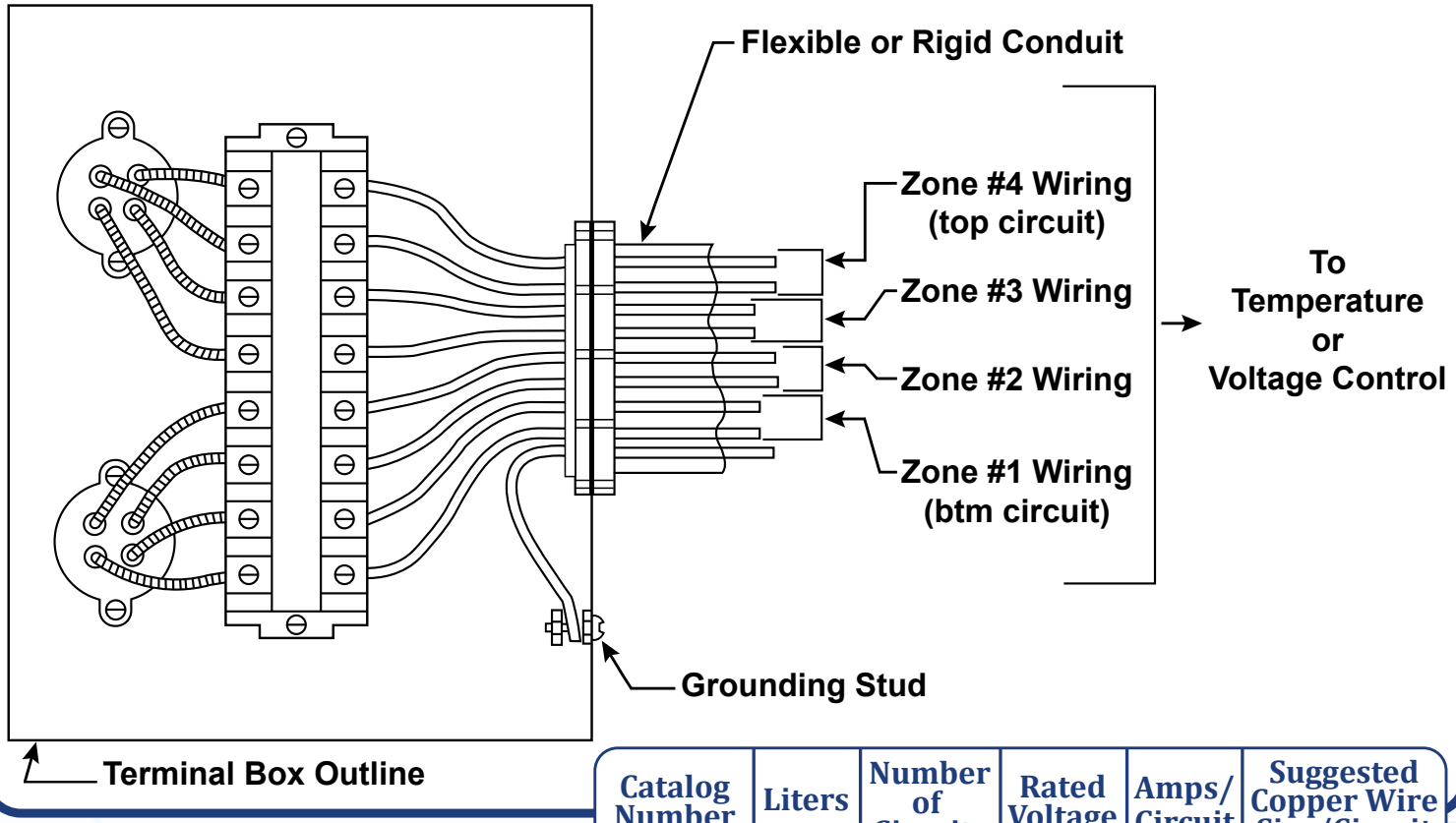
TYPICAL CIRCUIT FOR MANUAL CONTROL



TYPICAL CIRCUIT FOR AUTOMATIC CONTROL



Typical Terminal Box Arrangement for Glas-Col Catalog Numbers TM120 through TM126 STM1400 through STM1900



Catalog Number	Liters	Number of Circuits	Rated Voltage	Amps/ Circuit	Suggested Copper Wire Size/Circuit
TM120	50	3	115	8.7	#14
TM122	72	2	230	8.7	#14
TM124	100	3	230	7.8	#14
TM126	200	4	230	8.7	#14
STM1400	12	2	115	8.7	#14
STM1500	22	3	115	8.7	#14
STM1600	50	3	230	8.7	#14
STM1700	72	4	230	8.7	#14
STM1800	100	4	230	11.7	#14
STM1900	200	4	230	17.4	#12

NOTE:
All field wiring to Series TM Mantles should be rated at 105°C.

All field wiring to Series STM Mantles should be rated at 125°C.

All field wiring should be done in accordance with National Electrical Code procedures.