

# Chromalox®

## Installation Instructions

### SERVICE REFERENCE

DIVISION 4

SECTION GTF

SALES  
REFERENCE (Supersedes PD444-1)

PD444-2

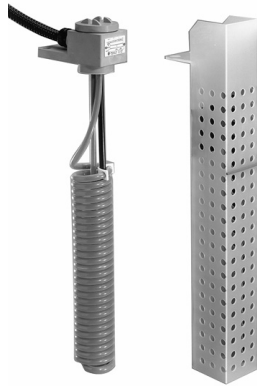
161-562652-001

DATE DECEMBER, 2004

## Chromalox® Type GXF/GTF/GTFL Series Grounded Teflon® Immersion Heaters



GXF/GXFL



GTF



GTFL3



GTF6

### GENERAL

#### ⚠ WARNING

**FIRE/EXPLOSION HAZARD: This heater is not intended for use in hazardous atmospheres where flammable vapors, gases, liquids, or other combustible atmospheres are present as defined in the National Electrical Code. Failure to comply can result in explosion or fire.**

Chromalox type GTF series of Teflon® over-the-side immersion heaters are especially suited for most plating tank and other corrosive solutions. It is inert to acid baths, anodizing and picking operations up to 212°F solution temperatures.

#### ⚠ WARNING

**Sheath corrosion can result in a ground fault which, depending upon the solution being heated, can cause an explosion or fire.**

**IMPORTANT: It is the responsibility of the purchaser of the heater to make the ultimate choice of sheath material based upon his knowledge of the chemical composition of the corrosive solution, character of the materials entering the solution, and controls which he maintains on the process. Chromalox cannot warrant any electric immersion heater against failure by sheath corrosion if such failure is the result of operating conditions beyond our control.**

#### 1. Heater Construction Characteristics

- A. High quality resistance wire held in place by compacted magnesium oxide in stainless steel sheath and Teflon® covered.
- B. Low watt density.
- C. Grounded construction.
- D. Over-temperature protection.
- E. Epoxy filled, vapor tight, plastic terminal enclosure prevents entry of contaminants.
- F. Flexible conduit 3' long with 6" leadwire extension is standard.

#### ⚠ WARNING

**The system designer is responsible for the safety of this equipment and should install adequate back-up controls and safety devices with their electric heating equipment. Where the consequences of failure could result in personal injury or property damage, back-up controls are essential.**

## INSTALLATION

### ⚠ WARNING

**ELECTRIC SHOCK HAZARD. Disconnect all power before installing or servicing heater. Failure to do so could result in personal injury or property damage. Heater must be installed by a qualified person in accordance with the National Electrical Code, NFPA 70.**

1. Before installing the type GTF heater, inspect it for possible damage which may have occurred during shipment. Also, check to insure that the line voltage is the same as that stamped on the nameplate.
2. **IMPORTANT: Mount heater in the tank so the liquid level will always be above the effective heated portion of the heater. Provide expansion tank if necessary.**

### ⚠ WARNING

**FIRE HAZARD. If the heater is not properly submerged, the heating elements will overheat and could result in a fire or damaged equipment.**

3. Where work will pass over or near equipment, additional protection such as a guard, may be needed.
4. In an electroplating operation the heaters are not, under any circumstance, to be placed between the electrodes and the work.
5. A drip loop is recommended to minimize passage of moisture along wiring into terminal box and connections.

### ⚠ WARNING

**FIRE HAZARD. Since heaters are capable of developing high temperatures, extreme care should be taken to:**

- A. Avoid contact between heater and combustible material.
- B. Keep combustible materials far enough away to be free of the effects of high temperatures.

## WIRING

### ⚠ WARNING

**ELECTRIC SHOCK HAZARD. Any installation involving electric heaters must be performed by a qualified person and must be effectively grounded in accordance with the National Electrical Code to eliminate shock hazard.**

1. Electrical wiring to heater must be installed in accordance with the National Electrical Code and local electrical codes by a qualified person.
2. When element wattages are not equal, heaters must not be connected in series.
3. Under no condition should the conduit be cut shorter, or fumes will enter the cable and will be drawn into the heater and condense inside. The wiring will then be attacked and will shorten heater life.
4. Tamperproof wiring — epoxy imbedded prevents field rewire of individual elements.

**Representative wiring diagrams for heaters with Single use fuse (F) or Resettable fuse (RF) —**

Single phase heater circuit using a SPST thermostat. Line Voltage and/or current do not exceed thermostat or thermal fuse rating (Figure 3).

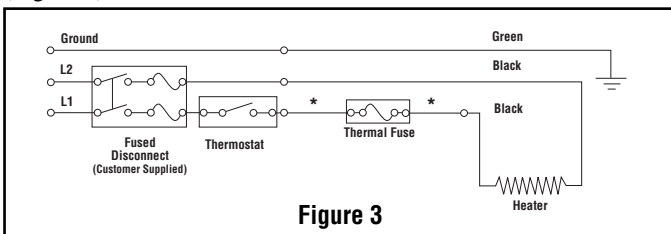


Figure 3

One Single phase heater or (3) single phase heaters equal in size and each having a thermal fuse wired as a 3 phase heater circuit using a DPST thermostat. Line voltage and current do not exceed thermostat or thermal fuse(s) rating (Figure 4). Dotted line and L3 indicates 3 phase connections.

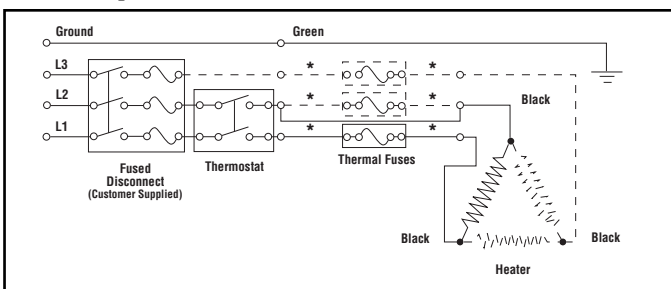


Figure 4

Single phase or 3 phase heater circuit. Line voltage and/or current exceeds thermostat or thermal fuses ratings (Figure 5). Dotted line and L3 indicates 3 phase connections.

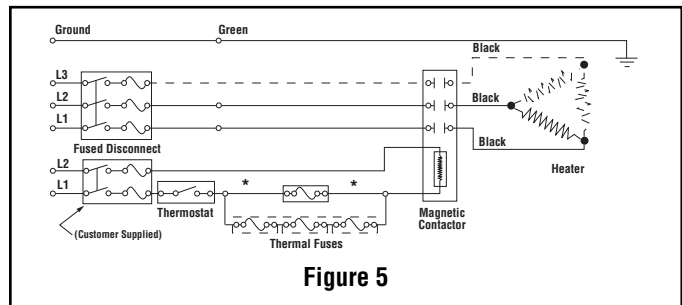
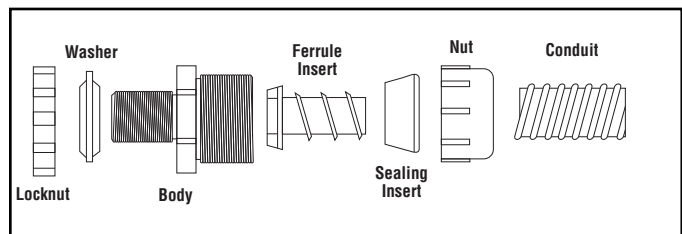


Figure 5

### Flexible Conduit Fittings —



1. Cut conduit. Slide nut and sealing insert onto the conduit.
2. Screw the ferrule insert into one end of the flexible conduit.
3. Seat the ferrule insert inside of the body, seat the sealing insert and hand tighten the cap onto the body.
4. Repeat steps 1 thru 3 above for the other end of the conduit after pulling the wires.
5. If the fitting is used in a threaded hole, first thread the body into the hole then follow steps 1 thru 3.
6. If the fitting is used thru an opening\* use the locknut and plastic washer to fasten it.

\* Opening for 1/2" NPT thread is 7/8".

## OPERATION

1. Do not operate heater at voltages in excess of that stamped on the heater since excess voltage will shorten heater life.
2. Always maintain a minimum of 2" of solution above the heated portion of the element to prevent exposure of the effective heated length. If the heater is not properly submerged, it may overheat and shorten heater life. *Do not operate heater if dry.*
3. Sludge should not be allowed to build-up to the point where it contacts heater as this can lead to premature heater failure. *Heater must not be operated in sludge.*
4. In an electroplating operation the heaters are not, under any circumstances, to be placed between the electrodes and the work.

## MAINTENANCE

### **⚠ WARNING**

**ELECTRIC SHOCK HAZARD. Disconnect all power before installing or servicing heater. Failure to do so could result in personal injury or property damage. Heater must be installed by a qualified person in accordance with the National Electrical Code, NFPA 70.**

1. Heaters should be checked periodically for coating and corrosion buildup and cleaned if necessary.
2. Tank should be checked regularly for sediment around the end of heater as this sediment can act as an insulation and shorten heater life.
3. **Note:** Before Teflon heater is removed from solution, it should be allowed to cool from 15 to 20 minutes.

## THERMAL FUSE INSTALLATION/REPLACEMENT

### **⚠ WARNING**

**ELECTRIC SHOCK HAZARD. Disconnect all power before installing or servicing heater. Failure to do so could result in personal injury or property damage. Heater must be installed by a qualified person in accordance with the National Electrical Code, NFPA 70.**

The Thermal fuse device must be properly installed and these procedures followed or heater failure or fire may result.

A liquid level control is a must as an additional safety feature to help minimize the possibility of fire.

1. Make sure all electrical power to the heater is shut-off.
2. Unscrew the head cover. Remove the wire nuts from the fuse leads and save for re-use.
3. Remove the "Sealing Putty" and pull the Thermal fuse out of its well. Clean the "putty" out of the well and save for re-use.
4. Check the Thermal fuse and the inside of the well to see if it is wet. If wet inside, dry out well. Immerse the tube into the solution. If moisture appears again inside the well **DO NOT** use the heater! Call the factory for further advice.
5. If the removed Thermal fuse is dry, proceed by using it as a guide to cut and strip the wires of the new Thermal fuse.
6. Re-connect the Thermal fuse leads to the extension leads using the original wire nuts.
7. Re-insert the Thermal fuse into the well making sure it is "fully seated" to the bottom of the well.
8. Re-seal using the original "sealing putty" or an RTV type sealant.
9. Replace the head cover, return the heater to the tank.
10. Turn the power back on.

### **Thermal Fuse Temperature System —**

Be sure and satisfied that your process bath tanks are as well protected as possible from tank leaks, excessive evaporation, tank refill failures, and worker error.

Grounded Electric Immersion Heaters are practical, efficient and safe when used properly and installed in tanks that have

proper solution levels. Good ventilation, trained operators and safeguards such as liquid level controls and Thermal fuse over-temperature sensors.

Thermal fuse systems help reduce the hazards created by low liquid levels and when properly seated and wired, they will cut off the power to the heaters, thus avoiding the extreme temperatures resulting if solution levels are low enough to expose heater hot zones.

### **Single Use Fuse (F) —**

Sensor consists of a one-time thermal fuse sensor which is standard on all GTF over-the-side heaters.

The F thermal fuse is wired in series with the controller. To operate properly the fuse must be fully seated to the bottom of the thermowell tube. When the fuse "blows", shut off the main power to the heater, remove the spent fuse and install the new fuse. Refill the tank to the proper level prior to turning power back on. Replacement thermal devices must be purchased from Chromalox®.

### **Resettable Fuse (RF) —**

Sensor consists of a Bi-metallic thermostatic sensor, an audible alarm, alarm relay, and reset button.

The RF System operates on the same principle as the F except that the sensor does not "blow". It operates as a Bi-metallic thermostat which "opens" and sounds the alarm. The reset button must be pushed to re-activate the heater and control, after the solution level in the tank has been raised to the proper level.

### **⚠ WARNING**

**FIRE/SHOCK HAZARD: Before replacing fuse, make sure the cause of the "failure" has been detected and corrected.**

## THERMAL FUSE INSTALLATION/REPLACEMENT (con't.)

### Thermal Fuse Replacement Protection Devices

Model Number	Used On
FT RFT	Std. Teflon® Heaters
FLT RFLT	L- Shaped Teflon® Heaters

F Amp Capacity - 25 Amps; RF Amp Capacity - 5 Amps;  
Blank (low) Temp = 180°F

Low temp. most common for this style heater.

RF sensors require additional Control Components which include a Relay, Audible Alarm, and Manual Reset Pushbutton.

Specify 120 or 240V when ordering.

For process temperatures above 180°F, consult factory.

#### Limited Warranty:

Please refer to the Chromalox limited warranty applicable to this product at <http://www.chromalox.com/customer-service/policies/termsosale.aspx>.

**Chromalox®**  
**PRECISION HEAT AND CONTROL**

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