

# HEATEC TEC-NOTE

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## MAINTENANCE Heatec thermal fluid heaters

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### SAFETY

**Before performing maintenance on your heater please read the safety information shown in Heatec Tec-Note 7-04-141. It is the first Tec-Note in this manual. Review each procedure entirely before performing any of its instructions.**

**Do not deviate from these instructions unless you are sure it is safe to do so. If you do not perform step-by-step instructions in the order given you could create unforeseen safety hazards.**



Figure 1. Two Heatec horizontal helical coil heaters. One has an output of 60 million Btu/hour. The other has an output of 0.7 million Btu/hour.

### Scope

This Tec-Note provides instructions for maintenance on a variety of Heatec *thermal fluid* heaters (Fig. 1, 2, 3). A maintenance schedule is shown on the last page of this document. *The instructions apply only to our heaters that employ helical coils.*

### Variations

Instructions in this document are specific for heaters that have the burner management controls shown in Figure 5. These are currently used on most Heatec thermal fluid heaters.

The photos in this document show a variety of heaters and components. Your heater may differ from those shown. But most heaters have devices that perform the same basic functions despite differences. So you should be able to adapt the information presented herein to your heater.



Figure 2 (above). Heatec vertical helical coil heater. The burner is on its bottom and is up-fired.



Figure 3 (right). Heatec 3-pass vertical heater. Its burner is on its top and is down-fired.

## Intended users

Instructions in this document are intended for use by plant personnel who understand electrical shock hazards and how to avoid them. Such persons should also know about the usual burn hazards present when working with thermal fluids heated to temperatures in excess of 300 degrees F.

Some procedures require making electrical tests and settings inside the heater electrical control panel while it is open and electrical power is turned on. This should be done only by persons authorized by their employer to work inside panels while significant electrical hazards are present. Employers and/or owners should have prescribed safety procedures for such work.

## Cleaning strainer (M, Fig. 8)

1. Set **BURNER** switch to **OFF** (Fig. 5). Allow circulation pump to continue operating for approximately 5 minutes.
2. Set **CIRCULATION PUMP** switch to **OFF**.
3. Set all valves (Fig. 8) to mode for Clean Strainer (Fig. 4). Note: **Figure 6** shows positions of valve stems when valves are opened and closed.

Figure 4. Valve settings for operating modes.

Operating mode	Valves on heater thermal fluid piping			
	Valve No. 1	Valve No. 2	Valve No. 3	Valve No. 4
Run	Open	Closed	Open	Open
Purge	Closed	Open	Open	Open
Clean Strainer	Closed	Closed	Closed	Closed

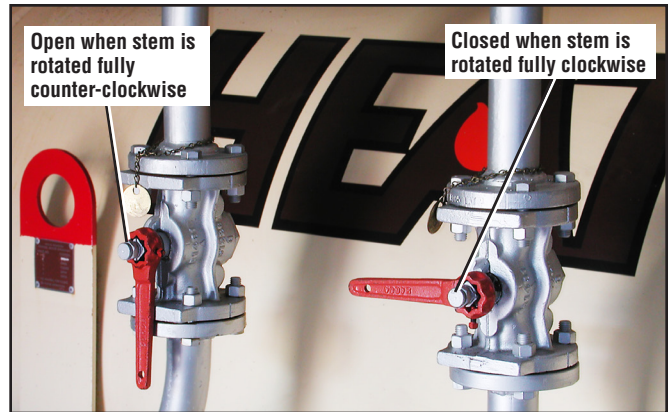


Figure 6. Opening and closing valves.



Figure 7. Wear chemical and heat resistant gloves as protection from hot thermal fluid when opening drain valve.

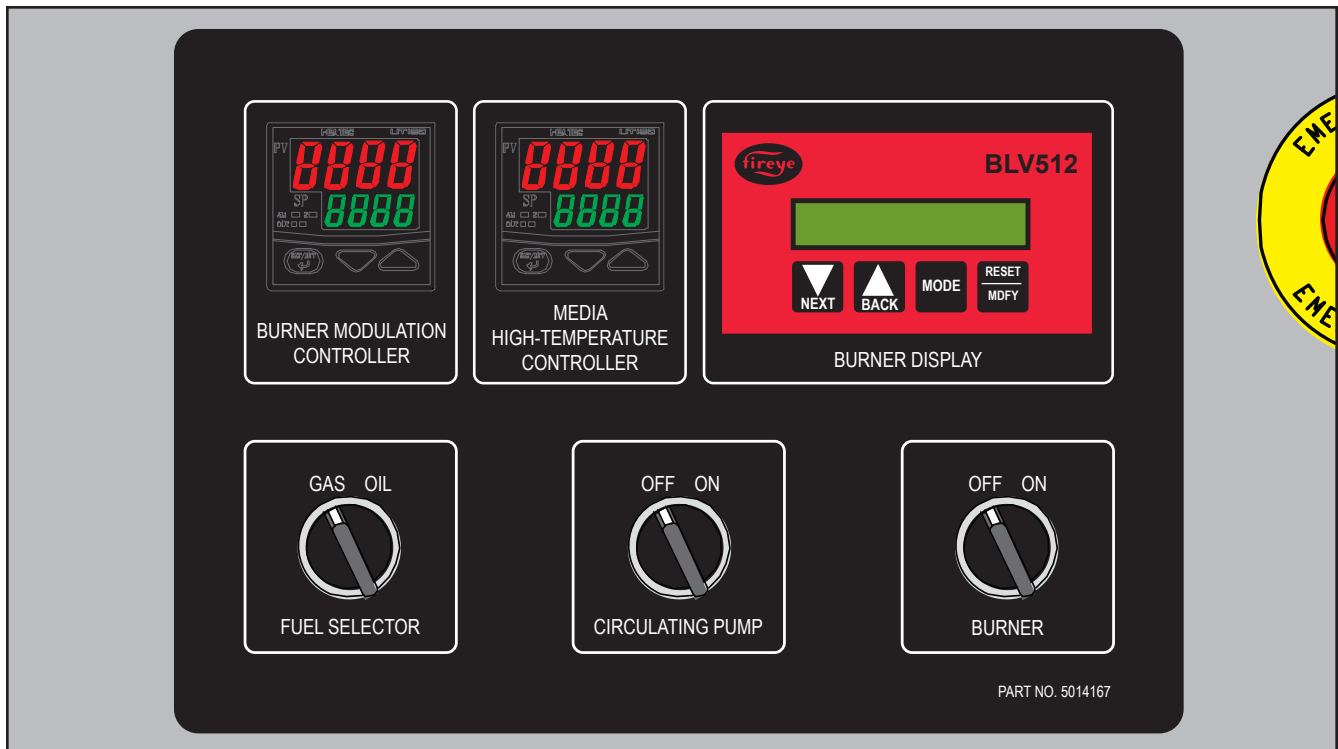
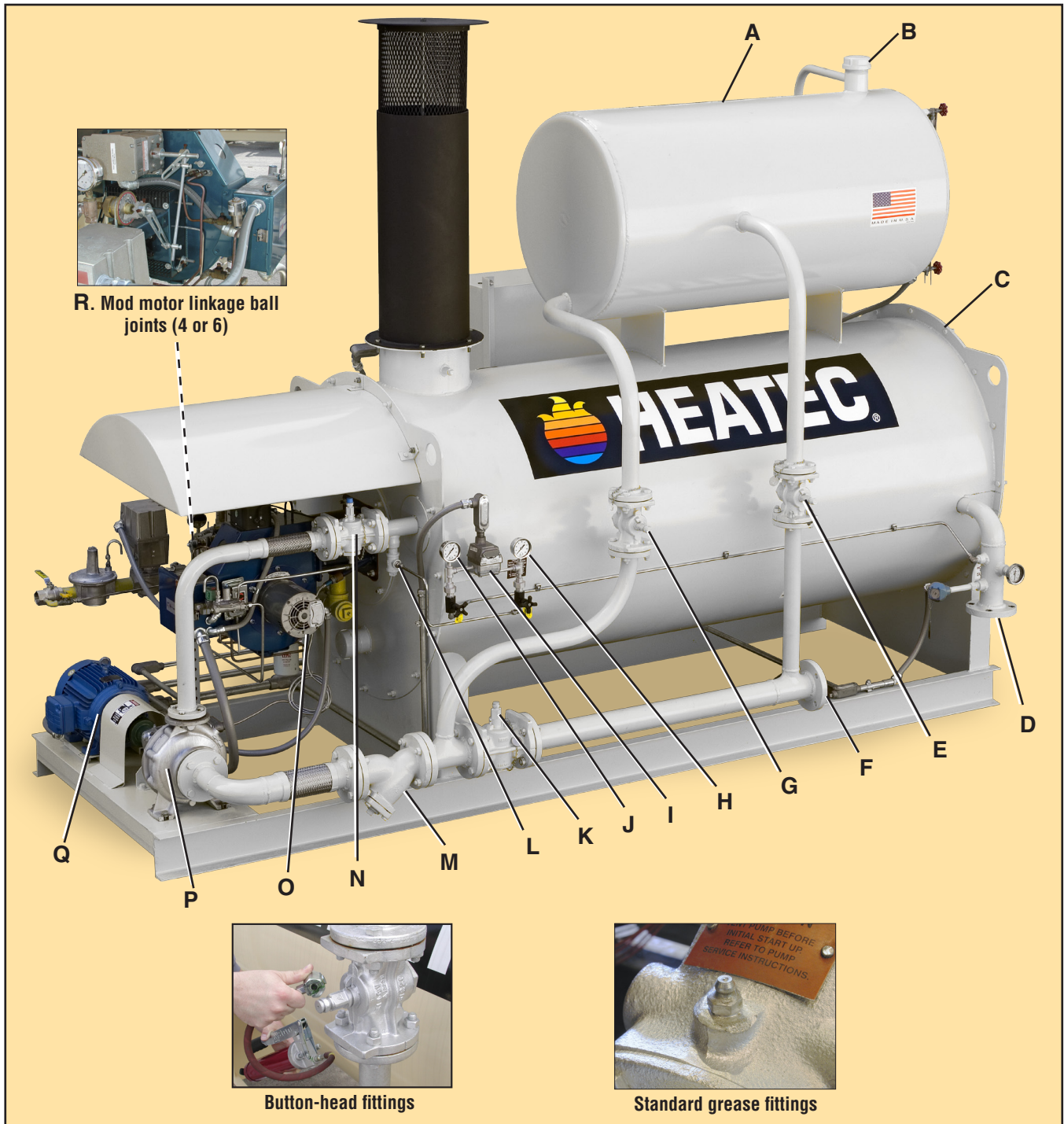


Figure 5. Operating controls currently used on most thermal fluid heaters.



- |  |  |
|--|--|
| <b>A. Expansion tank</b>               | <b>J. Outlet pressure gauge</b>                  |
| <b>B. Expansion tank filler</b>        | <b>K. Valve No. 1 (strainer)</b>                 |
| <b>C. Heater end cover plate</b>       | <b>L. Inlet pressure gauge port</b>              |
| <b>D. Outlet from helical coil</b>     | <b>M. Strainer</b>                               |
| <b>E. Valve No. 2 (purge)</b>          | <b>N. Valve No. 4 (coil inlet)</b>               |
| <b>F. Thermal fluid return inlet</b>   | <b>O. Burner fan motor</b>                       |
| <b>G. Valve No. 3 (expansion)</b>      | <b>P. Circulating pump</b>                       |
| <b>H. Inlet pressure gauge</b>         | <b>Q. Circulating pump motor</b>                 |
| <b>I. Pressure differential switch</b> | <b>R. Mod motor linkage ball joints (4 or 6)</b> |

Figure 8. Location of components on heater.

4. Place a bucket or other container (with a capacity of at least 5 gallons) under the drain valve (**Fig. 7**).
- CAUTION: Wear chemical and heat resistant gloves as shown in Figure 7.**
5. Open drain valve to drain thermal fluid from the strainer. Do not re-use this fluid. Dispose of it properly.
  6. Unbolt the square flange from the bottom of the strainer. Remove the flange, and the strainer basket will slide out.
  7. Clean the strainer basket with fuel oil, then dry completely with compressed air.
  8. Re-install the strainer basket and flange.
  9. Close drain valve.
  10. Install a cap on the drain valve (**Fig. 7**) to protect against accidental release of thermal fluid.

## Lubrication

All Heatec heaters have components that need periodic lubrication. **Figure 9** lists the components and the recommended lubricants. The keys in **Figure 9** match those in **Figure 8**.

## Cleaning sludge from expansion tank

Confirm that the expansion tank (**A, Fig. 8**) has sludge and needs cleaning. To do this, run a wooden stick through the filler all way to bottom of tank and try to move its tip back and forth in the fluid. If you detect resistance to its movement the tank has sludge. Withdraw stick and inspect its tip for further evidence of sludge. If sludge is present, clean the tank as follows:

1. Set **BURNER** switch (**Fig. 5**) to **OFF**. Allow circulation pump to continue operating for approximately 10 minutes.

2. Let the system cool.
  3. Close Valves No. 1, 2 and 4 (**K, E, and N, Fig. 8**).
  4. Place a container under the drain valve (**Fig. 7**). You will probably have to empty the container several times as you drain thermal fluid from the expansion tank.
- CAUTION: Wear chemical and heat resistant gloves as shown in Figure. 7.**
5. Open drain valve to drain thermal fluid from expansion tank. Some sludge will drain out with the thermal fluid. Do not re-use this fluid. Dispose of it properly.
  6. Remove the drain valve, the square flange, and the strainer basket from the strainer (**M, Fig. 8**).
- NOTE: Sludge will exit the strainer. Make provisions to capture the sludge so you can dispose of it properly.**
7. Insert a long spray nozzle from a pressure washer into the tank through the fill opening (**A, Fig. 8**). Wash until clean. Allow as much washing solution as possible to drain from the expansion tank.
  8. Clean the strainer basket with fuel oil, then dry completely with compressed air.
  9. Re-install strainer basket, square flange, and drain valve.
  10. Refill tank with clean thermal fluid.
  11. Purge system as instructed in applicable Tec-Note.
  12. After purge, set valves to mode for RUN as indicated in **Figure 4**.

**Figure 9. Lubrication requirements.**

See key in Fig. 8	Name	Type of Valve	Fitting	Lubricant	Frequency
K	Valve No. 1 (strainer)	Plug	Button head	Resun 104 or 104 G	monthly
K	Valve No. 1 (strainer)	Gate	Nipple	General purpose grease	monthly
E	Valve No. 2 (purge)	Plug	Button head	Resun 104 or 104 G	monthly
E	Valve No. 2 (purge)	Gate	Nipple	General purpose grease	monthly
G	Valve No. 3 (expansion)	Plug	Button head	Resun 104 or 104 G	monthly
G	Valve No. 3 (expansion)	Gate	Nipple	General purpose grease	monthly
N	Valve No. 4 (coil inlet)	Plug	Button head	Resun 104 or 104 G	monthly
N	Valve No. 4 (coil inlet)	Gate	Nipple	General purpose grease	monthly
P	Circulating pump(s)		Nipple	High temp lithium grease	2800 hrs operation
Q	Circulating pump motor		Nipple	General purpose grease	3 months
R	Modulating actuator linkage		(4 or 6 ball joints)	General purpose oil	monthly

# MAINTENANCE SCHEDULE

Heatec heaters should be checked periodically according to the requirements below. **Failure to properly maintain your heater could result in a fire or explosion.**

REQUIREMENT	WEEKLY	MONTHLY	QUARTERLY	YEARLY
Check for proper level of thermal fluid. Sight gauge on expansion tank should show at least 3 inches.	X			
Clean ultraviolet flame detector lens.	X			
Check intake area of blower to make sure it is not blocked by foreign material and is free from buildup of dirt.	X			
Check flame to ensure burner shows no symptoms of being in need of tuning.		X		
During normal operation check all pressure gauges and thermometers on heater for normal values.		X		
Check all operating and limit controls and settings to make sure they are set properly and are working properly.		X		
Check strainer to ensure it is not dirty.		X		
Check heater and piping to ensure there are no leaks of thermal fluid.		X		
Check heater to ensure there is no structural damage to heater shell, end plates, etc. or signs of over heating.		X		
Check pilot assembly to make sure spark gap is 1/8 to 3/16 inch.			X	
Check burner control linkage to make sure it is not binding or loose.		X		
Have exhaust stack gases analyzed and have burner tuned by a specialist				X
Have thermal fluid analyzed to ensure it is not degraded.				X
Lubricate heater components, including linkage, valves, motors, pumps. (Lubricate monthly or as recommended by the manufacturer.)		X		