

HEATEC TEC-NOTE

Publication No. 12-04-153 Revised 1-24-05

OPERATION

HFP SERIES HEAVY FUEL PREHEATERS

This document provides step-by-step instructions for startup of new HFP series preheaters. HFP models are heated by thermal fluid. These instructions are intended for use by qualified asphalt plant operators and maintenance personnel. Such persons are familiar with the burn hazards of working with thermal fluids heated to temperatures in excess of 300 degrees F. Such persons also understand electrical shock hazards and how to avoid them.

Figure 1 shows the position of the coupling when the valve is fully closed. When the valve is fully closed, the flow of thermal fluid completely bypasses the fuel preheater so as to discontinue heating. When the fuel pump is not operating the valve should be fully closed.

⚠ DANGER



SHOCK HAZARD. High voltage is present on certain terminals and wires inside this panel. Touching them will cause death or serious injury.

Do not open this panel unless you are a qualified technician familiar with the hazards of electricity.

Some circuits in this panel may receive electrical power from remote sources. Thus, the breaker operator on the door may not deenergize all exposed live parts.

Always use a voltage tester to make sure there is no voltage on terminals or bare wires you may touch.

⚠ PELIGRO

RIESGO DE ELECTROCUCION. Hay voltajes elevados presentes en algunos bornes y alambres dentro de este tablero. El tocarlos causará la muerte o lesiones graves.

No abrir este tablero a menos que sea un técnico calificado y familiarizado con los riesgos de la electricidad.

Algunos circuitos de este tablero pueden recibir energía eléctrica de otras fuentes. Por lo tanto, es posible que el disyuntor de la puerta no desconecte la energía de todas las piezas descubiertas.

Siempre usar un probador de voltaje para comprobar que no haya voltaje presente en los bornes o alambres desnudos que podrían tocarse.

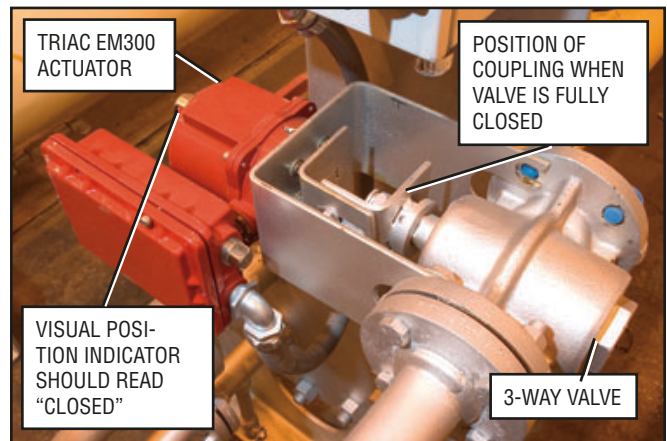


Figure 1. Position of coupling when valve is closed.

Figure 2 shows the position of the coupling when the valve is fully open. When the valve is fully open, thermal fluid flows through the preheater and none is bypassed. This provides maximum heating.

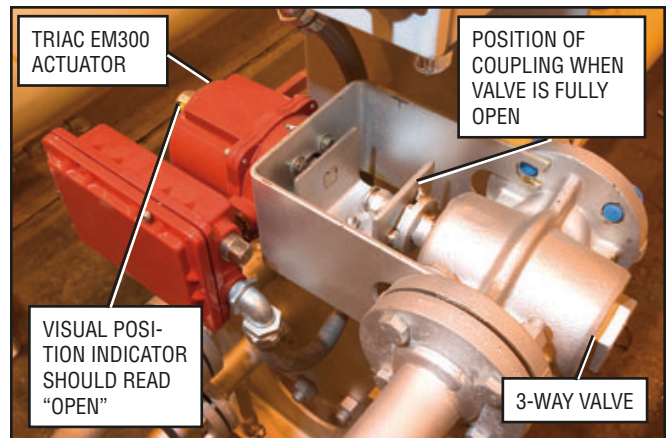


Figure 2. Position of coupling when valve is open.

Valve positions

Before operating the preheater you should become familiar with the positions of the coupling that connects the Triac EM300 modulating actuator (Fig. 3) to the 3-way valve.

The modulating actuator can position the valve anywhere between the fully closed and fully open positions so as to regulate the amount of thermal fluid flowing through the preheater according to the amount of heating needed.

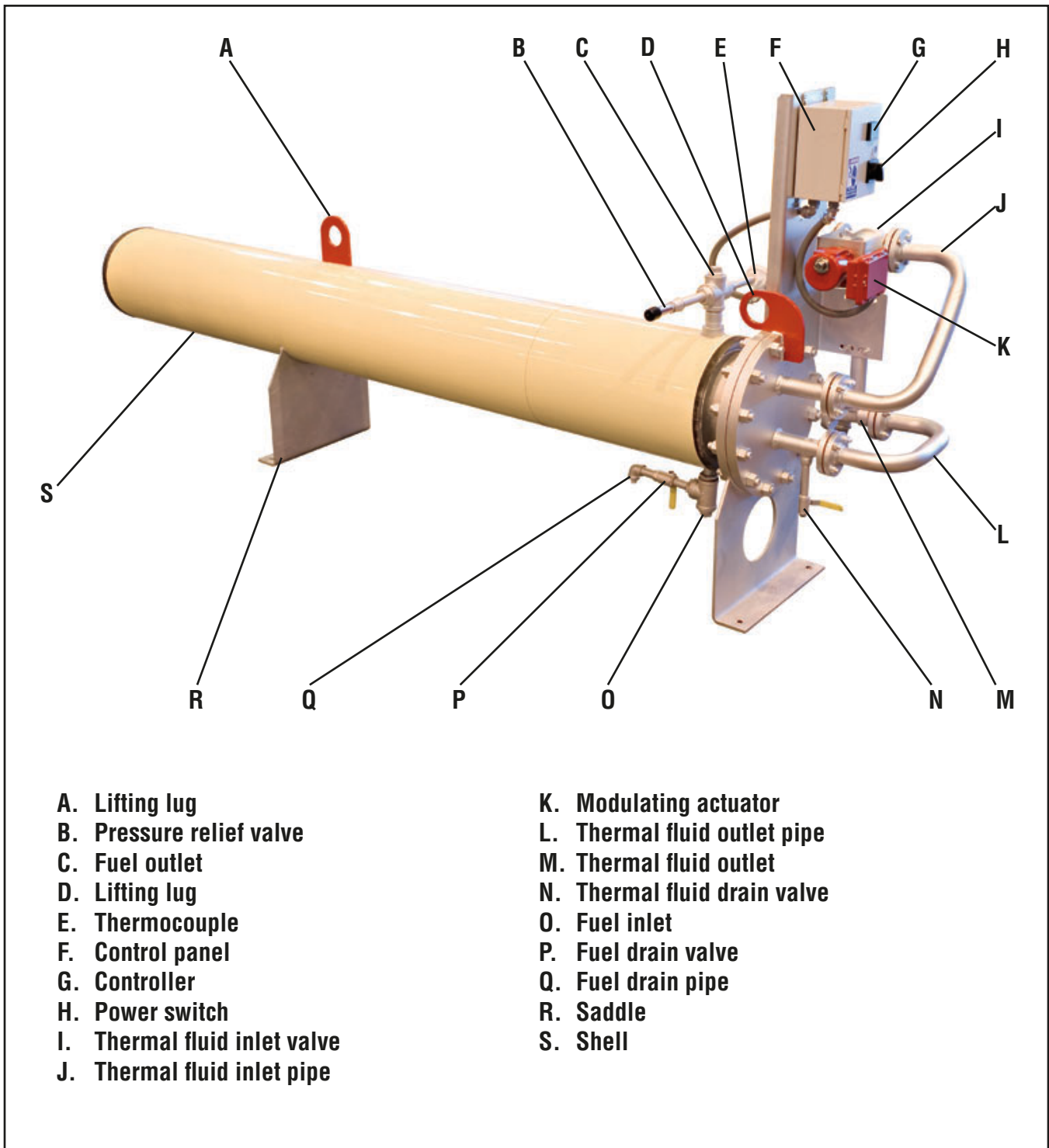


Figure 3. Major components of HFP series fuel preheater.

Drain water from the fuel tank

Before you fill the preheater with fuel, drain all water from the fuel tank. Some fuels may contain up to 2% of water. Therefore a 10,000 gallon tank filled with fuel could include up to 200 gallons of water. Water is heavier than fuel, so it will settle at the bottom of the fuel tank. You must drain water from the fuel tank to avoid filling the preheater with water. If the preheater contains water when hot thermal fluid enters the heating coils, the water can suddenly turn to steam. This results in excess pressure, forcing steam to exit from the pressure relief valve (*B, Fig. 3*). You should drain water from the fuel tank weekly, or whenever you expect excess water to be in the tank. After all water is drained from the fuel tank, the preheater is ready for startup.

Startup

The very first time you start up the preheater, let it operate for several hours, then shut it down. Let the preheater cool down overnight. Then use a torque wrench to make sure the 7/8-inch nuts at the heating coil assembly flange are tightened to a torque of 520 ft-lbs. Tighten the 1/2-inch nuts at the thermal fluid pipe connections to a torque of 75 ft-lbs.

Note: The torque values cited here for the coil flanges and pipe flanges are for *unlubricated* or *dry* threads. These values are different from the values cited in the Maintenance Tec-Note, because you should lubricate the threads when you reassemble the preheater.

1. Before normal daily startups, drain all water that may have condensed overnight from the preheater as follows:
 - a. Make sure fuel pump is turned off and preheater has cooled.
 - b. Place bucket or suitable container under fuel drain (*Q, Fig. 3*). The preheater could contain up to 1 gallon of water before startup.
 - c. Open the fuel drain shutoff valve (*P, Fig. 3*) to release water. Water is heavier than fuel, so it will settle at the bottom of the preheater. Therefore, water will drain out before fuel.
 - d. When you first see fuel flowing from the drain, close the valve.
 - e. Dispose of the collected water and fuel properly according to environmental regulations.
2. Make sure the shutoff valves for the preheater fuel inlet and outlet are open.
3. Activate power to the preheater at the plant breaker panel.
4. Set the main power disconnect switch on the preheater control panel (*Fig. 4*) to **ON**.
5. For skid-mounted systems with HFP preheater, set the main power disconnect switch on the power panel for the fuel pump motor starter (*Fig. 5*) to **ON**.

6. If you have installed a bypass circuit in the thermal fluid piping to the preheater, make sure the circuit is open to allow thermal fluid to circulate through the preheater.
7. Turn on the fuel pump. If the circulating fuel is cold, the modulating actuator (*K, Fig. 3*) will immediately open the thermal fluid inlet valve (*I, Fig. 3*) fully.



Figure 4. Control panel on HFP model preheater.

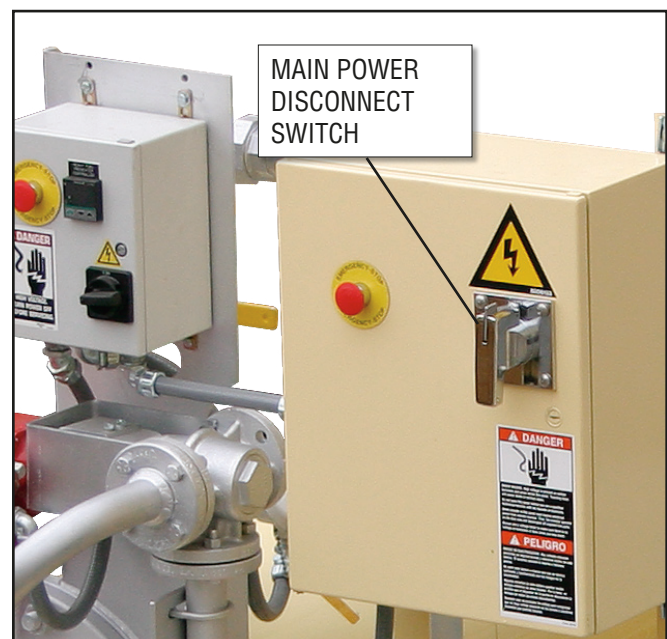


Figure 5. Power panel for fuel pump motor starter on skid-mounted system with HFP preheater.

Setting controller

Set the Yokogawa UT150 temperature controller (*Fig. 4*) according to Heatec Tec-Note 8-04-144. During auto-tune, the modulating actuator (*K, Fig. 3*) will open and close the thermal fluid inlet valve (*I, Fig. 3*) several times while the controller automatically sets PID settings.

Note: If there is no heat load or the heat load is cycling on and off, the controller cannot auto-tune. Run auto-tune when a steady heat load is available.

You should write down the PID settings the controller set during auto-tune. Also write down the date and the ambient temperature at your plant. This information may be very useful for future troubleshooting or in case you have to replace the controller.

After auto-tune is complete, the preheater is ready for normal operation. The preheater is designed for fully automatic operation, so no other settings should be necessary.

Daily Shutdown

For normal daily shutdown, simply turn off the fuel pump. Because the fuel pump is electrically interlocked with the thermal fluid inlet valve (*I, Fig. 3*), the actuator (*K, Fig. 3*) will set the valve to bypass fluid from the preheater.

Replacing actuator, valve and coupling

In the event that you ever dismantle or replace a modulating actuator, 3-way valve or coupling, it is essential to make sure they are re-assembled properly. The information shown in *Figures 1, 2 and 6* should enable you to properly reassemble these parts.

Flow direction in three-way valves is indicated by a small notch or step in their stem as shown in *Figure 6*. The notch is near the end of the stem as shown.

The stem can be rotated a quarter turn so that the notch faces either one of two flanges. The notch faces the flange that is closed or blocked. Thus, flow is through the other two flanges.

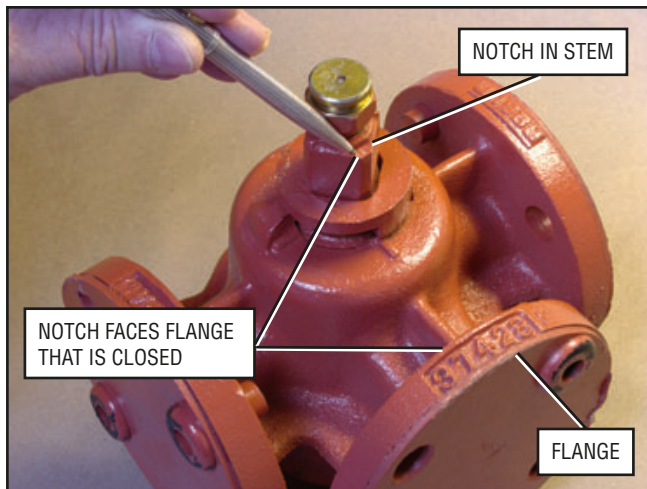


Figure 6. Direction of flow in 3-way valve.

Take special note of the visual position indicator on the Triac EM300. The “**OPEN**” reading can be changed to read “**CLOSED**” and vice-versa by loosening the retaining screws on its housing and simply rotating it 90 degrees (*Fig 7*).



Figure 7. Visual position indicator on Triac EM300.