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THERMAFLOW HEATING SYSTEM

Operating Manual

Thermaflow Heating System has a patent pending. Plastic Welding & Fabrication, Ltd. owns the sole license agreement to manufacture and distribute the product.

It is extremely important that the liquid level in the tank to be heated is no more than 10" from the top of the tank. The operating level should be maintained 6" to 8" from the top at all times during operation. The Thermaflow relies on the liquid to absorb the heat during operation, and allowing the liquid level to get too low could results in the system safeguards to shut the heater off, and damage to the unit is possible. The heater relies on high fluid levels to quench the internal top portion of the graphite so melt down of the plastic housing will not occur. Care should be taken to make sure liquid lost to evaporation is replaced on a timely basis.

Always make sure the unit is turned off before draining a tank. It is good practice to manually turn the gas valve off at the burner before draining the tank or removing the heater from a tank. If the heater is in the tank with a fluid level and the heater is off, the air must be on to avoid corrosion of the burners fire tube.

Start-Up

1. **Start combustion blower. This switch is usually located by the blower.**
2. **At control panel, turn power to "on." The switch should illuminate and the limit check light should illuminate.**
3. **Push reset button on high and low gas pressure switches. Air pressure switch has no reset.**
4. **Turn switch "on" at heater to be started. The instrument will cycle on and give temperature and set point in about 10 seconds.**
5. **The switch at the heater started will illuminate in about 10 seconds, indicating the heater is on.**
6. **Repeat process for all heaters.**
7. **If unit fails to start, see Trouble Shooting section.**

Operation

Thermaflow Heaters are designed to run trouble-free. As with any equipment, periodic inspections should be performed to insure all equipment is intact and safeguards are in good operating order. In the event flame goes out, first make a visual inspection of the unit to make sure it is not damaged and the liquid level is good. In the event the high limit light is illuminated, check the unit as follows:

- **Check liquid level in tank.**
- **Visually inspect heater for possible damage.**

Turning Unit Off

If a Thermaflow unit is to be turned off and left in the tank, it is highly recommended that the air be left on. This is to keep the burner purged with air to avoid contact of the liquid in the tank with the burner nozzle. Corrosion of the nozzle would occur in time.

If the tank is to be drained, it is recommended that in addition to turning the unit off at the control panel that the manual gas valve located at the heater be turned off as well. It is necessary to turn off the air after the fluid level is 12" below the top of the Thermaflow heater.

Trouble Shooting

Problem	**Nothing happens when power is turned on.**
Possible solutions	**Check light bulb.** **Check incoming power.** **Check circuit protector in panel.**
Problem	**No limit check light.**
Possible solutions	**The limit check is a series of three pressure switches. One is connected to the combustion air line (low air), one to the gas line before the regulator (low gas), and one to the gas line after the regular (high gas). Be sure combustion blower is on. Push reset button on switches one at a time, watching the light. If any one of the switches resets, then a condition occurred that caused it to break the circuit. Restart the system and contact the manufacturer.**
Problem	**High limit light.**
Possible solutions	**If it comes on during normal operation, check level in tank. Fill if necessary before attempting to restart. If the instruments reads "high," the thermocouple circuit is bad, and the thermocouple should be replaced.**
Note	**The flame relay located inside the control panel (1 for each heater) has a reset button located on the front. Make sure the button is in the out position at all times for proper operation.**

Refer to the following pages of the Future Design 9090 Controller Manual for further troubleshooting:

The Procedures
Maintenance & Troubleshooting
LED Status

Heater Setting

Pressure readings are read as differentials across orifices located at burner. Taps are located for gas and air and are represented in inches water columns.

Preflux

Air_____
Low gas_____
High gas_____

Acid 1

Air_____
Low gas_____
High gas_____

Acid 2

Air_____
Low gas_____
High gas_____

Acid 3

Air_____
Low gas_____
High gas_____

Acid 4

Air_____
Low gas_____
High gas_____

Caustic

Air_____
Low gas_____
High gas_____

Customer_____

Job Number_____

Date_____

How the System Works:

1. **An individual heater is turned on at the control panel.**
2. **Power is sent to the Eclipse veriflame located in the control panel.**
3. **The veriflame opens the heaters solenoid valves allowing natural gas to flow to the combustion burner mounted on the heater housing and graphite tube for a period of 10 seconds. (There is no pre-purge.) At the same time, the veriflame is sending power to the transformer which ignites the spark plug on the combustion burner.**
4. **With proper air, gas flow and ignition, the combustion burner will deliver a flame through the graphite tube located in the poly housing and transfer heat to the tank liquid. There is a sight glass at the top of the burner for a visual inspection.**
5. **There is also a flame rod located on the top of the combustion burner. Within the 10 seconds of the solenoid valves being opened and the spark plug igniting, the flame rod must sense a flame or the interlocks will close which shuts the gas supply off.**
6. **If a signal of flame failure appears on the veriflame, go through these list of events to trouble shoot and contact the manufacturer.**