HEATEC TEC-NOTE

Publication 1-10-217

OPERATION
FIRESTORM™ WATER HEATERS

SAFETY

Before starting your heater please read the safety information shown in Heatec Tec-Note 1-10-213. It is the first Tec-Note in this manual. Then read this entire document before performing any of the instructions.

Do not deviate from these instructions. Perform step-by-step instructions in the order given. Otherwise you could create unforeseen safety hazards.

DANGER!

Do not work inside the control panel while it is energized unless you are authorized by your company to do so. Follow all of your company's safety procedures, especially those pertaining to arc flash. Do not touch live or energized terminals. Wear a face shield, protective clothing and insulated gloves while working in the panel. You could be killed or seriously injured if you fail to take these precautions.

Scope

This Tec-Note provides step-by-step instructions for operation of Heatec Firestorm water heaters **(Fig. 1)**. Please see Heatec Tec-Note on **BURNER MANAGEMENT CONTROLS** for additional information related to operation of the Firestorm heater.

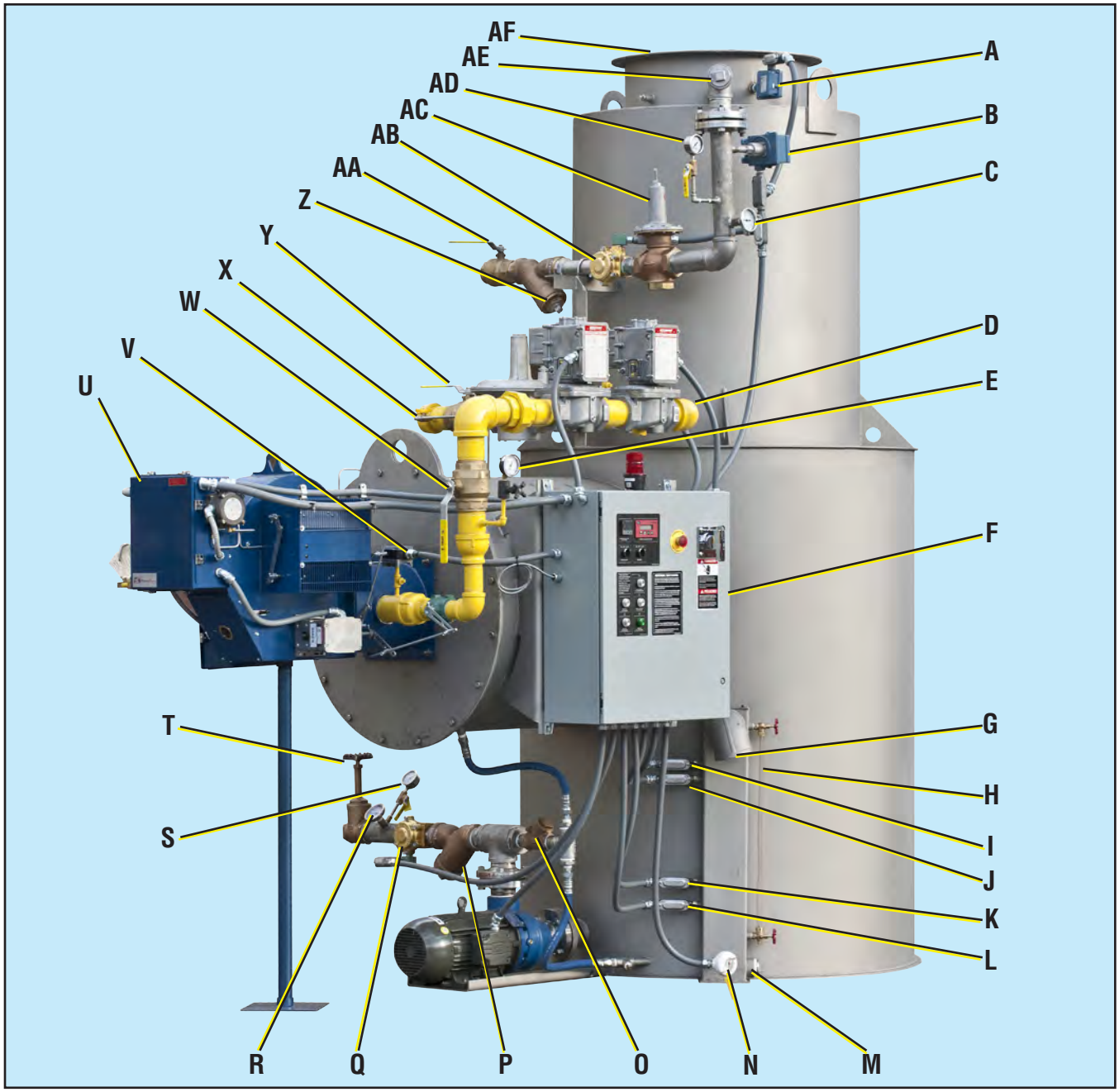
Intended users

Instructions in this document are intended for use by operators who understand electrical shock hazards and how to avoid them. Such persons should also know about the burn hazards possible from working around hot surfaces and hot water.

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.

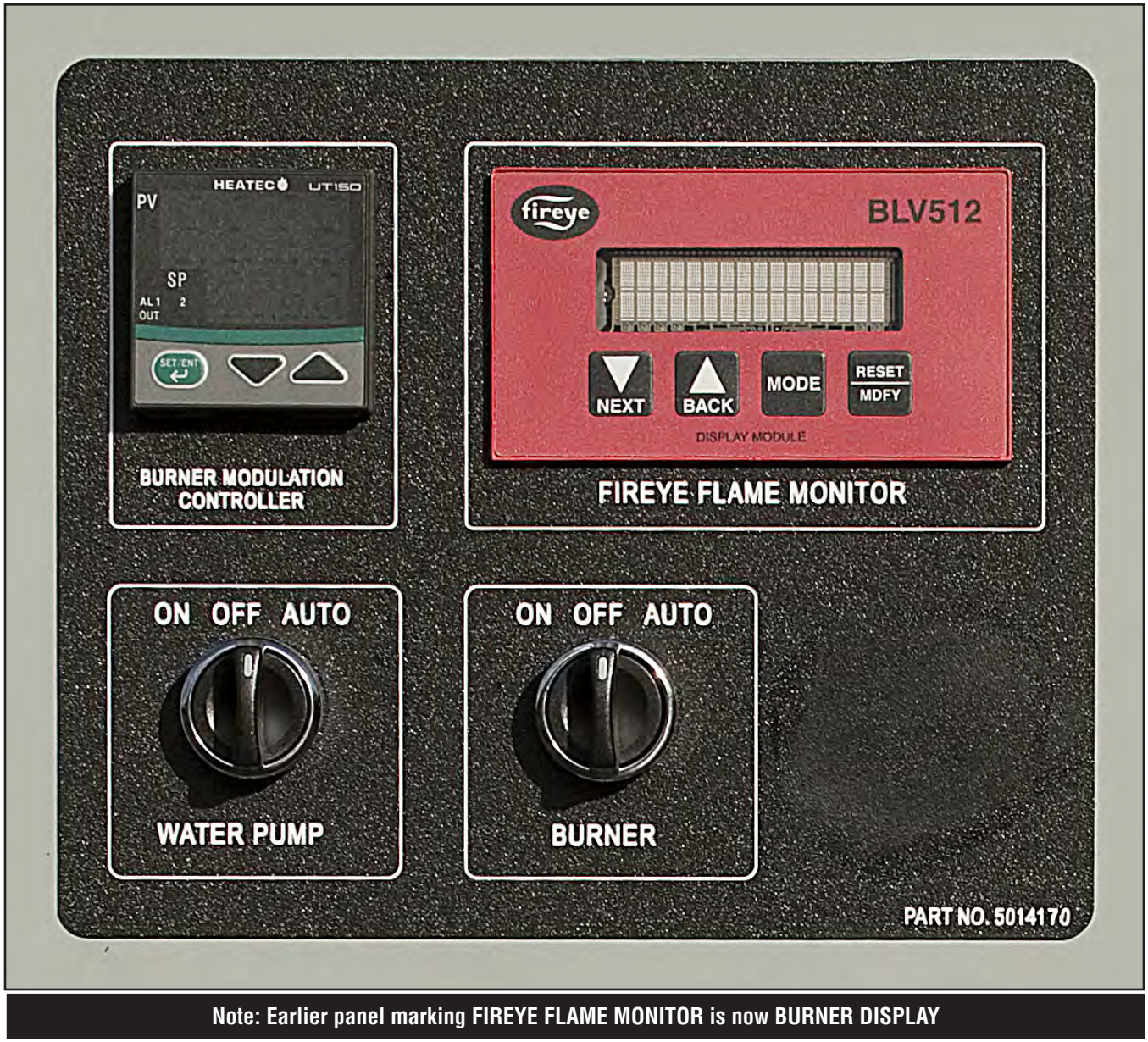
Figure 1. Heatec Firestorm heater.

Figure 2. Emergency stop and power disconnect switches.



A. Stack temperature switch
B. Inlet water pressure switch
C. Inlet water temperature gauge
D. Low gas pressure switch (not visible in photo)
E. Gas pressure gauge
F. Control panel
G. Overflow connection
H. Water level indicator
I. High-high water level switch
J. High water level switch
K. Low water level switch
L. Low-low water level switch
M. Drain connection
N. Thermocouple
O. Check valve
P. Outlet water Y-strainer
Q. Automatic outlet water valve
R. Outlet water temperature gauge
S. Outlet water pressure gauge
T. Manual outlet water valve
U. Burner
V. High gas pressure switch
W. Manual gas leak test valve
X. Pilot gas valve
Y. Manual gas shut off valve
Z. Inlet water Y-strainer
AA. Manual inlet water valve
AB. Automatic inlet water valve
AC. Inlet water pressure regulator
AD. Inlet water pressure gauge
AE. Secondary water connection
AF. Exhaust stack connection

Figure 3. Location of components on Firestorm heater.



Note: Earlier panel marking FIREYE FLAME MONITOR is now BURNER DISPLAY

Figure 4. Main operating controls.

Prior to startup

The following conditions are required prior to startup:

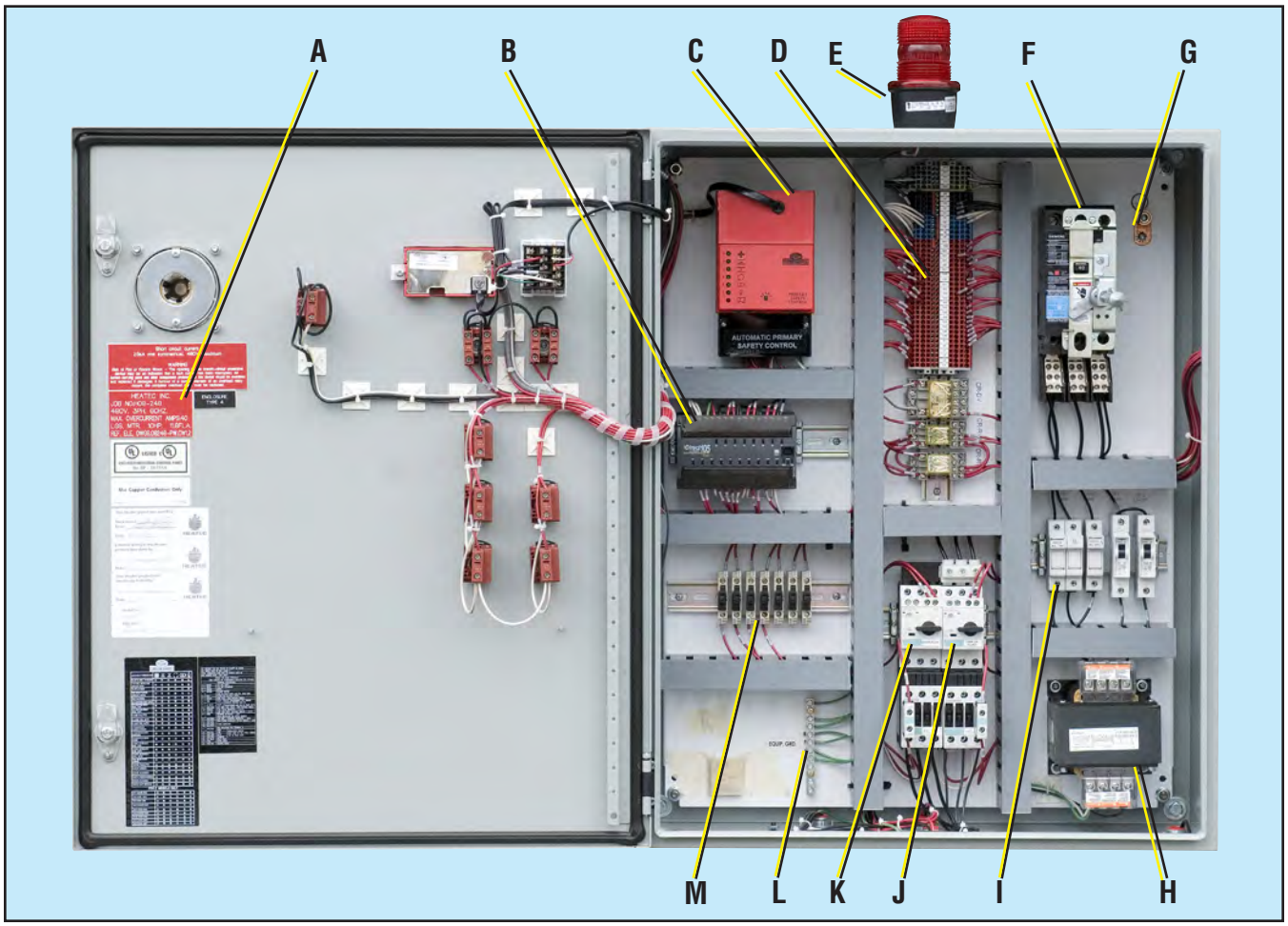
- The incoming gas supply line pressure is 0.5 psig.
- The heater is properly installed, piped, and wired.
- Water piping should be complete and leak-tested.
- Air connected to outlet water valve.

Preliminary procedure:

1. Make sure the power disconnect switch on the control panel **(Fig. 2)** is set to **OFF**.
2. Make sure the switches marked **BURNER** and **WATER PUMP** are set to **OFF (Fig. 4)**.
3. Make sure the inlet water valve **(AA, Fig. 3)** and outlet water valve **(T, Fig. 3)** are closed.
4. Make sure the two shutoff valves on the water level indicator **(H, Fig. 3)** are open.
5. When you drain water from the heater you may wish to drain it to a spot some distance from the heater. If so, install a drain valve and a hose (not supplied) at the drain connection **(M, Fig. 3)**.

The next 3 steps instruct you to work inside of the heater control panel while its parts are electrically energized with high voltage. You will need a voltmeter suitable for measuring up to 600 volts AC.

6. Open the control panel **(Fig. 5)** and turn on all breakers ***except*** the main disconnect breaker.
7. Note the voltage marked on the voltage label **(A, Fig. 5)** inside the door. Check that the voltage across the



A. Voltage label
B. PLC (Programmable Logic Controller)
C. Fireye burner management control YB110
D. Terminals and relays
E. Alarm strobe light
F. Main disconnect breaker
G. Grounding lug
H. Control transformer
I. Circuit breakers and fuse blocks
J. Blower motor controller
K. Water pump motor controller
L. Equipment grounding strip
M. Fused terminals

Figure 5. Components inside the control panel.

terminals at the *top* of the main disconnect circuit breaker **(F, Fig. 5)** *is the same as marked on the label*. Manually turn on the main circuit breaker and check for the same voltage across the terminals at the *bottom* of the breaker. Check for 120 vac across the secondary winding of the control transformer **(H, Fig. 5)**.

8. Make sure that the **EMERGENCY STOP** switch **(Fig. 2)** on the control panel operates properly. While power is *on*, and the panel door is open check for 120 vac across terminals 1 and 2 inside the control panel **(C, Fig. 5)**. Push in the **EMERGENCY STOP** switch. A light should come on inside the stop control. Now check to make sure there is *no* voltage across terminals 1 and 2. Reset the stop switch and close the panel door.

9. Set the **BURNER MODULATION CONTROLLER (Fig. 4)** per instructions that follow.

Setting burner modulation controller

1. Set the power disconnect switch on the control panel **(Fig. 2)** to **ON**.

   Displays of the **BURNER MODULATION CONTROLLER** and **BURNER DISPLAY (Fig. 4)** should come *on*.

2. Check the settings of the **BURNER MODULATION CONTROLLER (Fig. 4)** to *make sure* it is programmed according to the instructions in the applicable Heatec Tec-Note.

3 Adjust the set point on the **BURNER MODULATION CONTROLLER (Fig. 4)** to the desired temperature. To adjust

set point, use the up-down arrows on the controller. Press the **SET/ENT** key.

4. Set the power disconnect switch on the control panel **(Fig. 2)** to **OFF**.

Filling the heater with water

1. Set the power disconnect switch on the control panel **(Fig. 2)** to **ON**.
2. Make sure the drain **(M, Fig. 3)** is closed.
3. Open the inlet water valve **(AA, Fig. 3)**. Water should start filling the tank. When the water reaches the minimum level required for burner operation, the low water level switch **(K, Fig. 3)** will close and energize an electrical circuit to close the automatic inlet water valve **(AB, Fig. 3)**.

Setting inlet water pressure switch

The inlet water pressure switch **(B, Fig. 3)** is preset at the Heatec factory and does not normally need to be changed. Its setting should be the same as shown on the electrical drawing furnished with the heater.

Starting heater for the first time

1. Set the power disconnect switch on the control panel **(Fig. 2)** to **ON**.
2. Make sure the **BURNER MODULATION CONTROLLER (Fig. 4)** is set for the water temperature needed.
3. Make sure the drain **(B, Fig. 3)** is closed, the manual outlet water valve **(T, Fig. 3)** is closed, and the manual inlet valve **(AA, Fig. 3)** is open.
4. Momentarily set the switch marked **WATER PUMP (Fig. 3)** to **ON** and make sure the pump motor rotates clockwise as viewed from the back of the motor. If not, disconnect power and swap two the leads on the contactor for the water pump motor controller **(K, Fig. 5)**. Reconnect power and recheck rotation.
5. Momentarily set the switch marked **BURNER** to **ON** and make sure the blower motor rotates clockwise as viewed from the back of the motor. If not, disconnect power and swap two the leads on the contactor for the blower motor controller **(J, Fig. 5)**. Reconnect power and recheck rotation.
6. Set the switch marked **WATER PUMP** to **ON**.
7. Set the switch marked **BURNER** to **ON.** After about 2 minutes, the burner display should show the message **AUTO FLAME SIGNAL**. This indicates that the burner has ignited properly.
8. Slowly open the manual outlet water valve **(T, Fig. 3)** until the desired flow rate is obtained.

Shutting down the heater

1. While the heater is in low fire set the switch marked **BURNER** to **OFF (Fig. 4)**.
2. Set the switch marked **WATER PUMP** to **OFF (Fig. 4)**.
3. Make sure all manually operated valves are closed.
4 After the blower and pump stop running, set the power disconnect switch on the control panel **(Fig. 3)** to **OFF**.

Routine operation of the heater

After the heater has been checked out according to the preceding instructions it can be operated as follows:

1. Set the switch marked **WATER PUMP** to **ON.**
2. Set the switch marked **BURNER** to **ON.** After about 2 minutes, the burner display should show the message **AUTO FLAME SIGNAL**. This indicates that the burner has ignited properly.
3. Slowly open the manual outlet water valve **(T, Fig. 3)** until the desired flow rate is obtained. Most heaters have an automatic water valve. It maintains the water level in the heater reservoir while limiting cycling of the burner. For optimum operation, adjust the manual outlet valve so that water flows out of the heater slightly faster than it flows into the heater.
4. When hot water is no longer needed, shut down the heater according to the preceding instructions for shutting down the heater.

Daily startup checks

Perform a brief startup *check* once a day each day the heater is in use. After starting the heater, do the following:

1. Visually check to make sure there are no indications of hot spots, water leaks or loose parts. **If hot spots appear, immediately shut down the heater.** If you cannot determine and correct the cause, please call Heatec.
2. Make sure that conduit and conduit covers are not damaged from excessive heat.
3. Check the exhaust stack to make sure it is not smoking (other than the presence of white vapor).
4. Listen closely to make sure there are no abnormal sounds, noises or vibrations.

Abnormal shutdowns

If the heater encounters an abnormal operating condition it will shutdown and the red light on top of the panel will flash. You must find and fix the problem before you can restart the heater.

If a shutdown happens you will see a lockout message on the burner display.

The first line of the message indicates the operating condition when the lockout happened. The second line indicates what abnormal condition triggered the lockout. However, you mayp need to pinpoint the source of the problem.

A lockout message that says **LOCKOUT 3-P INTLK OPEN** indicates that one of the limit devices in the 3-P interlock circuit triggered the shutdown. In that case the first status light out provides a clue as to which device caused the shutdown. The label on that light denotes the device you need to check.

Lockout messages on the flame monitor may indicate that a shutdown was caused by abnormal conditions not related to the 3-P circuit. A message that says **M-8 LIMIT OPEN** is usually caused by a problem with the burner modulation motor.

A message that says **LOCKOUT STANDBY FALSE FLAME** indicates that the scanner detects a flame when the burner is *off* or during purge. If no flame is actually present, it usually indicates a faulty flame scanner.

A message that says **LOCKOUT PTFI FLAME FAIL** is usually caused by a problem with the flame scanner, or with fuel, or with ignition.

A message that says **LOCKOUT AUTO FLAME FAIL** is usually caused by a problem with fuel or combustion air.

Flame scanner precaution

The flame scanner and amplifier used on the heater is the non-self checking type. However, the flame monitor checks the flame scanner each time the heater is started. Consequently, it is ***extremely*** important that the heater cycles *off* and *on* a minimum of once every 12 hours.

Most Firestorm heaters will cycle at least once every hour in normal operation. However, if the demand on the heater is unusually constant, the heater may *not* automatically cycle *off* and *on* that often. Therefore, to ensure that the flame scanner is okay, you should manually switch the heater *off* for a second or two and then back *on.* Do this once each morning and once again late in the day.

In the event that the flame scanner fails while the heater is operating, it may not shut the heater down. Thus, the scanner could allow the fuel valves to remain open, even if there is an inadvertent loss of flame. This would allow the heater and surrounding area to become saturated with unlit fuel, creating an extremely unsafe condition.

If you try to restart a heater that has a defective flame scanner, the heater will not restart. Instead, the flame monitor will show the message **STANDBY FALSE FLAME**. A defective Fireye burner management control can cause a false flame indication. However, a defective flame scanner is usually the problem.

Never disconnect and reconnect the flame scanner or take any other action to circumvent the scanner in order to restart the heater. Instead, replace the component. Otherwise, you could create an unsafe condition as described above.

