

Know-how

Technical Corner

Flame Detection

by: David Crotts, Field Service Representative



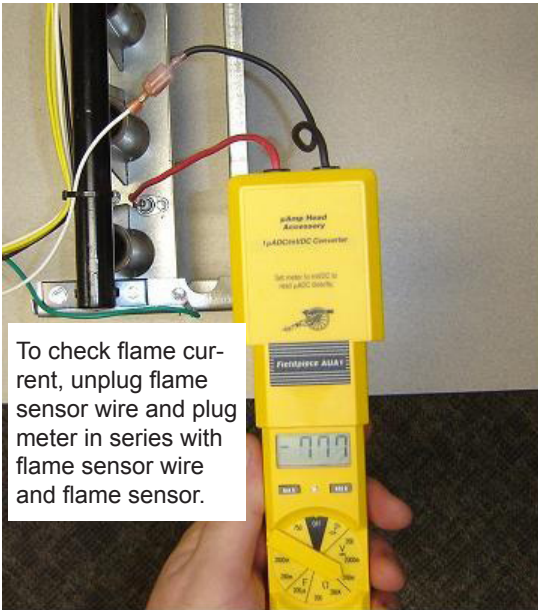
Flame Detection:

Most modern ignition circuits use some form of hot surface ignitor or spark ignitor with a stand alone flame sensor. This flame detection system operates on the premise that as gas and air are consumed, ionization occurs. These ions make it possible for a weak but adequate electrical current to be carried by the burner flame.

The flame detection circuits used on most gas systems consist of a flame sensor (flame rod) connected by wire to the integrated furnace control (IFC). The IFC sends a potential of 60-100 volts to the flame sensor. This potential exists during both the on and off heating cycles. When ignition occurs, the current flows from the flame sensor through the burner flame onto the metal burner housing and then to ground. This small current is called DC rectified current. This current draw usually measures in the range of .5-10 microamperes, D.C. Typical minimum levels are 1 ma/DC for White Rodgers IFC's, and .5 ma/DC for Texas Instruments or Honeywell IFC's. Normal readings are usually 2-6 ma/DC.

This current rectification normally occurs within two seconds and most systems shut off the gas value if the flame is not sensed in about 4 seconds. Detecting this extremely low current requires a multimeter that is capable of measuring 0-20 D.C. Microamperes. A flame current adapter kit is available to fit most meters with a DC volt scale.

Most low flame current readings are a result of poor or incomplete combustion or caused by a dirty flame sensor. The flame sensor should be cleaned with steel wool (not sand paper). Sand paper may leave a silicone residue that will insulate the flame rod.



To check flame current, unplug flame sensor wire and plug meter in series with flame sensor wire and flame sensor.

If proper current flow is measured, but lock-out still occurs, the most likely cause is a poor burner ground. Check that the burner mounting points are free of rust and that all screws are in place. Also check that all ground wires are in place and in good condition. A good ground means a ground all the way to the meter base.

Keep in mind that most IFC's are now mounted on plastic stand-offs and that grounding the common wire or "B" side of the transformer may eliminate rectification problems. Replacing the IFC (ignition control) should be replaced only after making these checks. Also, note that the flame detection circuit is in place during the off cycle to guard against over-heating should a gas valve stick open. It will activate the combustion blower and indoor fan motor to try to prevent a catastrophic failure.

Cleaning the flame sensor and checking flame current should become part of your routine maintenance visit. It will eliminate problems for your customer and help take the mystery out of the flame circuit diagnosis.

If you have technical questions about Trane HVAC equipment, call David Crotts at 864.923.2385, or email him at dcrotts@gwd-ac.com.