The Calorimeter Temperature Sensor

- Flame Sensor

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The development of the C-3500 flame intensity calorimeter was primarily for the measurement of combustion chamber heat fluxes in power generating facilities. The calorimeter temperature sensor allows the direct and instantaneous power evaluation of combustion chamber gasses for best stoichiometric fuel/air mix. Additionally, the calorimeter is widely used in verifying heat source intensities at different cracking tower stations along the complete oil refinery process, which assures process repeatability.

What Is Flame Sensor

Another important application is applied to the flame testing of materials and components under Federal Aviation Regulations. Other applications include power generation, hotbox flame control, jet exhaust output, natural gas energy content, reactor output, furnace intensity and several ASTM flame test evaluations.to many items more than a dollop of cheap aftershave, a squirt of toothpaste and a Bic disposable razor.

The flame intensity temperature sensor is a 1.00 - 2.00 inch diameter, rod that is placed in direct contact with the heated gasses. The signal generated is directly proportional to the local heat flux; a radial traverse of the source yields a measure of the total power output. The sensor yields D.C. millivolt signals that can be measured with conventional millivolt meters or recorders.

The C-3500-3600 Flame Calorimeter is to be inserted through a port directly into the combustion gas stream. The HT-50 High Temperature Heat Flux Transducer has been welded and heat sunk to a location 50mm from the tip of the C-3500 Probe(C-3600 has sensor at tip of probe). The location of this sensor is on the same side as the water discharge port and has been temporarily marked for your convenience. This location should be noted and situated so that the combustion gasses impinge directly upon it.

The calorimeter includes an inner water feeding tube within the hollow cylindrical probe. Cool water enters through the inner tube and flows out through the annular gap between the inner tube and inner wall of the outer probe tube. A control system varies the rate of flow of water to maintain the inside temperature of the probe wall at a constant value. Water coolant should be supplied to the probes rear inlet at a flow rate of 10 - 20 Liters/Minute. Boiling of the cooling water must never be allowed, for very high thermal flux rates, the water/coolant flow rate must be increased until the exit water temp is tepid. The average heat flux is calculated by multiplying the C-3500-3600 Calibration Constant by the measured DC micro-voltage.

In order for a furnace to operate the flame must be proved. This means the furnace needs to know that there is a flame present and burning and if not then it has to shut off the gas supply so a build up of explosive gas does not occur.Most newer furnaces use a technique called flame rectification to determine this. This is accomplished with a simple device called a flame sensor. The sensor is a small stainless steel rod that is insulated with a ceramic insulator.

A wire is attached to the sensor on the bottom. The sensor is positioned in front of the burner which is the furthest burner from the burner that has the ignitor. When the furnace turns on the ignitor glows red hot. Then the gas valve opens and allows gas to flow through the burners and ignites when the gas passes over the hot ignitor.

So… What's Next ?

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