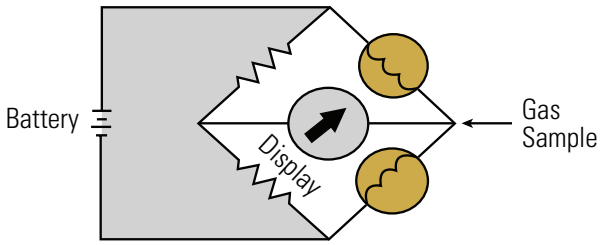
Catalytic Diffusion Sensor in a Wheatstone Bridge Circuit

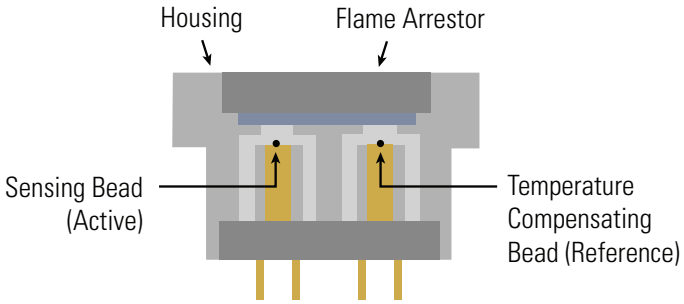
Catalytic diffusion sensors are the most widely used devices for the detection of combustible gases and vapors. These sensors start with wire being wound into coils. These coils are then doped with two types of catalysts: one to make the element active and one to make it blind. These different coils are then matched into pairs of reference and sensing elements. This forms a combustible gas sensor.

This sensor is then placed into a circuit *(see figure 1)*, where a fixed voltage is applied across both elements, causing them to heat up to very high temperatures. The sensor is also connected to a balanced resistance, a Wheatstone Bridge, which detects changes in the resistance of the sensor's elements. When a combustible gas comes in contact with the sensor, the active element begins to burn the gas causing it to increase the temperature. The temperature of the reference element remains unchanged because it is incapable of burning gas. The increased heating of the active element causes an unbalance in the circuit and this is interpreted as a positive combustible signal.

Because combustion is taking place within the sensor chamber the sensor must be designed and built in such a way that it is intrinsically safe and will not act as an ignition source in the event it is exposed to a combustible atmosphere. This is accomplished through the use of a flame arrestor *(see figure 2)*. This device, usually made of a sintered material, acts as a cooling path for gases escaping the sensor. Only units that have been tested and approved by third party approval agencies (UL, CSA, MSHA, FM or CENELEC) can be trusted to be intrinsically safe.



Wheatstone Bridge Circuit
Figure 1



Combustible Gas Sensor
Figure 2

Minimum oxygen requirements for proper combustible gas detection is 10% vol.

NOTE: Do not attempt to disassemble a sensor; if the sensor is cracked, dented, or otherwise visibly damaged, the sensor must be packaged and returned to Industrial Scientific or disposed of according to official regulations. For additional information, please contact your local Industrial Scientific representative. Global contact information can be found at www.indsci.com/offices.