

HOT-WIRE ANEMOMETER (THERMORESISTIVE TRANSDUCER)

The hot-wire (h-w) or hot-film (h-f) anemometer is a thermo resistive transducer used in the microstructure analysis of gas and liquid flows. Consequently it is useful in the study of flow problems related to the design of airplane wings, propellers, ventilation systems, and blood-velocity measurements for medical research.

The anemometers have a very small sensing element, which accounts for their high spatial resolution and fast response. The transduction mechanism in these transducers is the change in resistance of the sensor element, brought about by the convective heat lost because of the velocity of the fluid. The changes in resistance are caused by the thermo resistive effect and are measured with a Wheatstone bridge circuit.

The output of the bridge can be adequately expressed by King's law,

$$e_o^2 = A + BV^{0.5} + CV \quad (5.16)$$

where e_o is the output voltage of the bridge setup, V is the velocity of the fluid, and A , B , and C are constants.

These transducers consist of a thermo resistive sensing element suspended between two support prongs, a transducer handle, and electrical connections to the support prongs. The h-w transducer most commonly consists of a 5- μm diameter platinum-plated tungsten wire as shown in Fig. 5.14.

sensing element consists of a thin nickel film deposited on a 70- μm -diameter quartz fiber, which is suspended between the two prongs.

Typical sensor element resistance for the h-w transducer is 3.5 Ω , and the velocity measuring range is from 0.2 to 500 m/s.

Source: <http://mediatoget.blogspot.in/2012/05/hot-wire-anemometer-thermoresistive.html>