3.8: Miscellaneous Sensors

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This page is a summary of different sensors not as commonly used as others in industry. This page details the methods of operation, industrial uses, and other relevant information about the sensors.

8.1 Humidity Sensors

“Humidity sensors are used to control the amount of water vapor present in many industrial processes. Textile, wood, and chemical processing is very sensitive to humidity” [1]

8.1.1 Psychrometers

Psychrometers use latent heat of vaporization to determine relative humidity in the system. This can be done by using a dry bulb thermometer with a wet bulb thermometer. The two temperatures recorded can be used with a psychrometric chart to obtain the relative humidity, water vapor pressure, heat content, and weight of water vapor in the air.

8.1.2 Hygrometers

Hygrometers are devices that sense the change in either their physical or electrical properties. Some materials such as hair or thin strips of wood change length depending on water content. The change in length is directly related to the humidity.
8.1.3 Dew Point Measuring Devices

These devices measure humidity by cooling the air until water starts to condense on the object. The amount that the air needed to be cooled before water started to form on the object can be used to determine the relative humidity.

8.1.4 Other Humidity Sensors

Microwave absorption by water vapor can be used to measure the humidity in a material. Infrared absorption can be used by hitting the object with infrared radiation and measuring the energy of the reflectance.

8.2 Sound Sensors

Sound sensors are important because they can be used in industrial applications such as detection of flaws in solids and location and linear distance measurements. Sound pressure waves can also cause vibration and failure.

8.2.1 Microphones

Microphones are pressure transducers, and are used to convert sound pressures into electrical signals. There are six types of microphones: electromagnetic, capacitance, ribbon, crystal, carbon, and piezoelectric.

8.3 Smoke Sensors

Smoke sensors are useful for not only safety for workers, but also environmental concerns and purity issues of processes.

8.3.1 Infrared Sensors

These sensors detect changes in a signal received from an LED due to smoke or other objects in the light path from the LED.

8.3.2 Ionization Chambers

These devices can detect the difference in current between two plates that have a voltage between them. The difference is due to carbon particles from smoke that provide a conductive path between the two plates.

8.3.3 Taguchi-Type

Taguchi-type sensors are used to detect hydrocarbon gases, such as carbon monoxide and carbon dioxide. The sensor is coated with an oxidized element that when combined with a hydrocarbon creates a change in the electrical resistance of the sensor.
8.4 References