

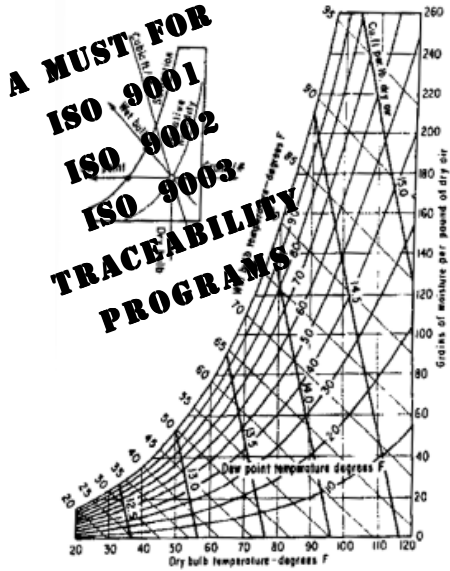
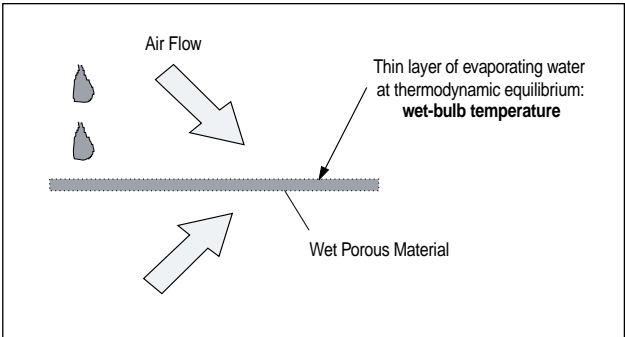
D-Series Handheld IR Scanners



**Infrared
Psychrometry**
 with the
**Microscanner
D-Series:**
 Measure
Relative Humidity
 to
Certified Accuracy
±0.5% RH

Psychrometrics, the science of measurement and control of moisture in air, is based entirely on thermodynamics of air and water: the properties and *temperature*. Relative humidity (RH) is one of the common parameters used to describe the psychrometric state of air in an environment, in an oven, or any area where moisture content can influence product quality or personnel comfort.

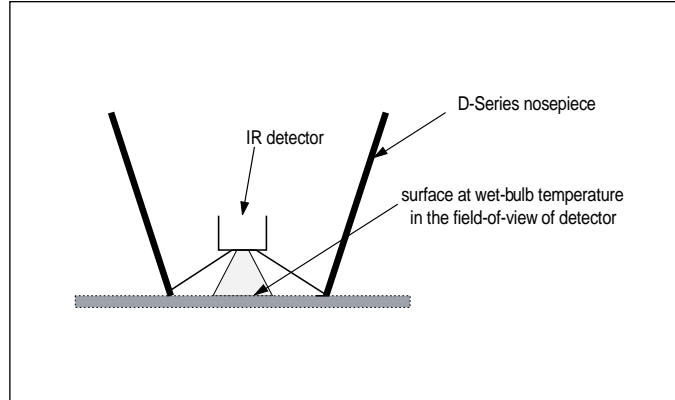
The accurate and reliable measurement of RH is one of the most challenging tasks in industry, and has included devices such as chilled mirrors, lithium chloride cells, aluminum oxide sensors, capacitance polymer sensors, hair hygrometers, carbon hygriators, and a wide variety of technologies to meet the requirements. Calibration and certification has been even more difficult, due to the fact that most humidity measuring devices employ *indirect* methods and therefore have limited traceability.



The Infrared Psychrometry method with the D-Series is a direct application of the thermodynamics and mathematics that defines humidity: the D-Series is capable of measuring the true wet-bulb temperature accurately, and with the dry-bulb temperature, the RH can be computed to a very high accuracy via standard psychrometric equations. The process is as follows:

A porous material (filter paper is suitable) is wetted with water (purity is not important), and air from the environment flows across the surface to bring the surface to thermodynamic equilibrium with the air, i.e. to the lowest possible temperature produced by the evaporating water, which is the wet-bulb temperature.

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The porous material, cooled on both sides by evaporating water, reaches wet-bulb temperature throughout the material, thus maintaining wet-bulb temperature at the surface for several seconds after the air flow stops. Since the water is opaque to infrared wavelengths, in as thin a layer as .002 in. (.05 mm), and the D-Series is able to measure the temperature with a time constant of 0.1 seconds, an accurate measurement of the wet-bulb temperature is obtained. The same procedure is employed on a non-porous material to obtain an accurate dry-bulb temperature.

With the appropriate psychrometric equations, the RH is immediately calculated. Each D-Series is

equipped with, as a standard accessory, an RH Kit, which includes a convenient card with the wet and dry materials, simple RH and Dewpoint calculator, and handy tube of water.

Maximum accuracy for RH measurement is obtained with the D-Series models measuring 0.1° resolution. Though the absolute accuracy of the D-Series is not 0.1°, the RH is most sensitive to wet-bulb depression, i.e. the difference between dry-bulb and wet-bulb temperature. In its differential mode, the D-Series is accurate to 0.1°, which translates to an RH accuracy of approximately 0.5% for the normal range of RH.

