NYAD MOISTURE ANALYZER

RESPONSE TIME

Due to several variables, which include initial dewpoint, final dewpoint, sample flow rate, temperature, pressure, materials of containment, and sample composition can effect response time.

In addition to these external variables, each individual sensor is unique and can have response characteristics that differ from others. To illustrate what you can typically expect from most Nyad moisture sensors under specified conditions:

Place the sensor in stainless steel small volume flowcell. Connect to a source of dry air with a dewpoint of –60 C or less with ¼" stainless steel tubing. Assuming a starting dewpoint of +10 C. Begin flowing the purge air at a rate of about 500 cc/min. The indicated dewpoint will drop quickly and should reach a value of –40 C in 30 seconds or less. To equilibrate to the value of the purge gas will be 6 to 8 hours. As you might conclude, the driving force for drying is the differential between the purge gas and the initial conditions of the sensor and its environment (eg +10 C). As the differential decreases, the rate of drying drops accordingly.

It is also important to consider the materials of the sensor chamber, as one of the unusual properties of water, is its ability to absorb onto surfaces with different degrees of tenacity, depending on the composition. A good demonstration of this effect is to place the sensor down stream of the test sensor and raise the temperature of the test chamber by 10 degrees c. The resultant increase in dewpoint can readily be observed by the unheated sensor down stream due to the de sorption of water from the heated surface.

At this point, there may be several questions unanswered. To give some generalizations to start from, but quantitative answers will depend on the specific conditions of real system.

a) Response to increasing moisture will be faster than to decreasing.
b) Faster response will result with higher purge flow rates and greater dewpoint differentials between the purge gas and the initial dewpoint level.
c) Response in systems with large surface areas will be slower than small surfaces.
d) Non-metallic environments will respond slower than metal surfaces, such as stainless steel.