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Aluminum Oxide Moisture Transmitter Application Note

Application: Purified Gas

Application Description:

Purified gases are used in many industries including the manufacturing of industrial gases such as nitrogen, helium, argon, and oxygen. Other industries use or manufacture purified gases including medical, petro-chemical, steel, welding, food & beverage, semi-conductor, and specialty gas production. To ensure the quality of these gases, measurement of the moisture content is one of many measurements performed.



Factors to Consider Effecting the Moisture Measurement:

Because dew/frost point is a function of the system pressure, the dew/frost point is commonly measured at one of two convenient pressure levels: system pressure or atmospheric pressure. For a given moisture content, the higher the process pressure, the higher (wetter) the dew/frost point. The factors normally used to assist with this decision are usually either that the dew/frost point at line/process pressure is required, so the dew/frost point measurement is accurate for the process line conditions, or the gas is allowed to expand (normally over a needle valve) to atmospheric pressure, allowing for dew/frost point readings that are always relative to atmospheric pressure. Also, atmospheric pressure dew/frost point allows for easier conversion to a parts per million (PPMv) measurement because the pressure never varies from atmospheric pressure. In other words, the PPMv calculation will always be based on atmospheric pressure.



When measurements in gases are expressed in terms of PPM, they are usually on a “volume” basis, so the designation “PPMv” is used. In purified gases, with low moisture concentrations, the equation to convert between dew/frost point and PPMv is:

$$\text{PPMv} = (P_W/P_T) \times 10^6$$

Where:

- P_T = Total System Pressure
- P_W = Water Vapor Pressure
- P_W can be determined using the measured dew/frost point and a Water Vapor Pressure Table (commonly found in technical reference material/books)

Typical Application Conditions/Parameters:

Moisture Level:

- From less than 1 PPMv to 200 PPMv
- Dew/Frost points from below -80°C to -40°C (-112°F to -40°F)

Pressure Level:

- 0 to 2000 psig (0 to 135 barg)

Temperature:

- Typically room ambient



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Equipment Recommended:

Product name and/or model number: AcuDew Moisture Transmitter



Potential Sample Systems depending on the conditions of the gas line:

