

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 purifed 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 on 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 atomspheric 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.

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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:

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

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



Equipment Recommended:

Product name and/or model number: AcuDew Moisture Transmitter



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



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