

Moisture sensor

Analysing Moisture in Various Gases

Online analysis of water in gases using gas chromatography (GC) can be challenging, particularly at low ppm concentrations, because water readily adsorbs onto surfaces within the sampling and analytical system. As an alternative to conventional GC-based moisture detection, water content can be measured using a dedicated moisture sensor. The sensor output data can be integrated into a Chromatography Data System (CDS), such as Chromeleon, allowing moisture results to be reported alongside GC data in a single, consolidated analytical report.



Figure 1
Moisture sensor &
process monitor display

Principle

Moisture is measured by the adsorption of water vapour onto a ceramic metal-oxide sensing layer. The resulting change in sensor capacitance is correlated to the water content of the gas and reported as dew point or moisture concentration.

Measuring Range

Measurements can be reported as either dew point or moisture content. Two operating ranges are available:

- Low range : -100 °C to 20 °C
- High range : -60 °C to 60 °C

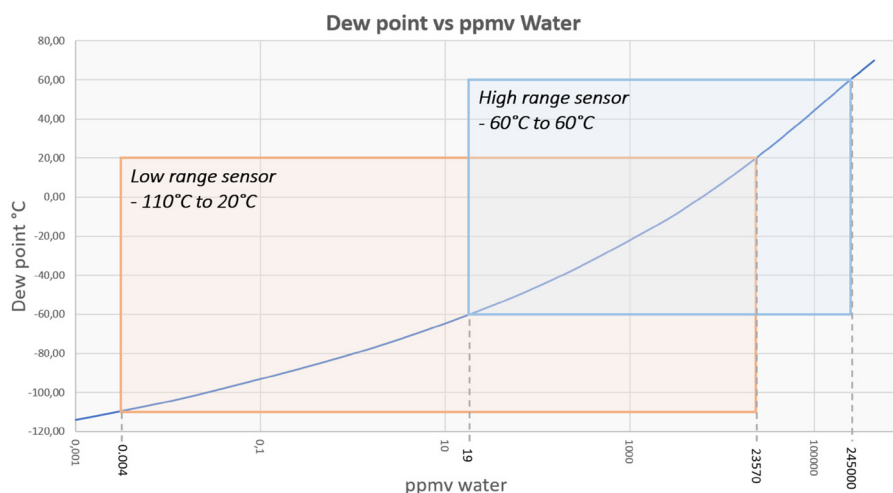


Figure 2
Dew point vs.
ppmv water

The GAS dewpoint transmitter is a single sensor suitable for all global dew point applications, which minimizes cost and stock management for the end user.

Features

- Measurement range -100 °C to +60 °C (-166 °F to +68 °F) dew point (using 2 sensors)
- Dew point or moisture content output
- Accuracy ± 1 °C (± 1.8 °F) dew point
- Pressure indication and compensation
- Touch screen display configuration
- 3 x 4 - 20 mA output and 4 relay outputs
- Modbus RTU over RS485 output
- Choice of AC or DC Power Supply
- Sample block and cable included
- Traceable 13-point calibration certificate

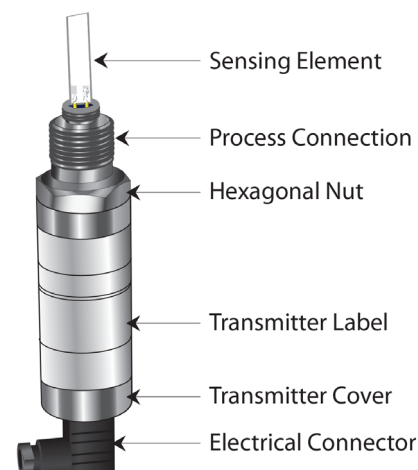


Figure 3 Transmitter

Chemical Compatibility

The response and selectivity of the sensor are influenced by the presence of other components and depend on both the type and concentration of these components, as illustrated in Figure 4.

Gas/Vapour	Maximum Permitted Concentration (ppm)	Maximum Permitted Dewpoint (°C)	Explosive Limits in Air (%)
Acetylene (Ethyne) (C ₂ H ₂)	◆	-20	2.50–80.0
Ammonia (NH ₃)	1000	-20	16.0–25.0
Aromatic alcohols	no limit	no limit	
Benzene (C ₆ H ₆)	no limit	no limit	1.4–7.1
Bromine (Br ₂)	no limit	-20	
Carbon dioxide (CO ₂)	no limit	-20	n/a
Carbon monoxide (CO)	no limit	no limit	12.5–76.2
Carbon disulphide (CS ₂)	no limit	no limit	
Carbon tetrachloride (CCl ₄)	no limit	no limit	n/a
Carbon tetrafluoride (CF ₄)	no limit	-20	
Chlorine (Cl ₂)	not permitted	not permitted	
Dichlorodifluoromethane (CCl ₂ F ₂)	no limit	-20	
Ethane (C ₂ H ₆)	no limit	no limit	3.0–12.5
Ethylene (Ethene) (C ₂ H ₄)	no limit	no limit	2.75–28.6
Ethylene oxide ((CH ₂) ₂ O)	not permitted	not permitted	3.0–100
Exhaust gases	no limit	no limit	
Fluorine (F ₂)	10	-20	
Freon	Consult with MIL	Consult with MIL	
Glycol (HOCH ₂ CH ₂ OH) (Ethane-1,2-diol)	no limit	no limit	
Hydrobromic acid (HBr)	not permitted	-	
Hydrochloric acid (HCl)	not permitted●	-	
Hydrofluoric acid (HF)	500	-20	
Hydrogen peroxide (H ₂ O ₂)	not permitted	-	

Figure 4 Table chemical compatibility

Integration with Chromeleon CDS

The moisture level is digitally acquired by Chromeleon Chromatography Data System using the Modbus output of the sensor. The moisture level is displayed as a graph and reported as an additional analytical channel, alongside the GC detector results (see figure 5 and 6 below). This allows the complete sample composition to be available in a single report.

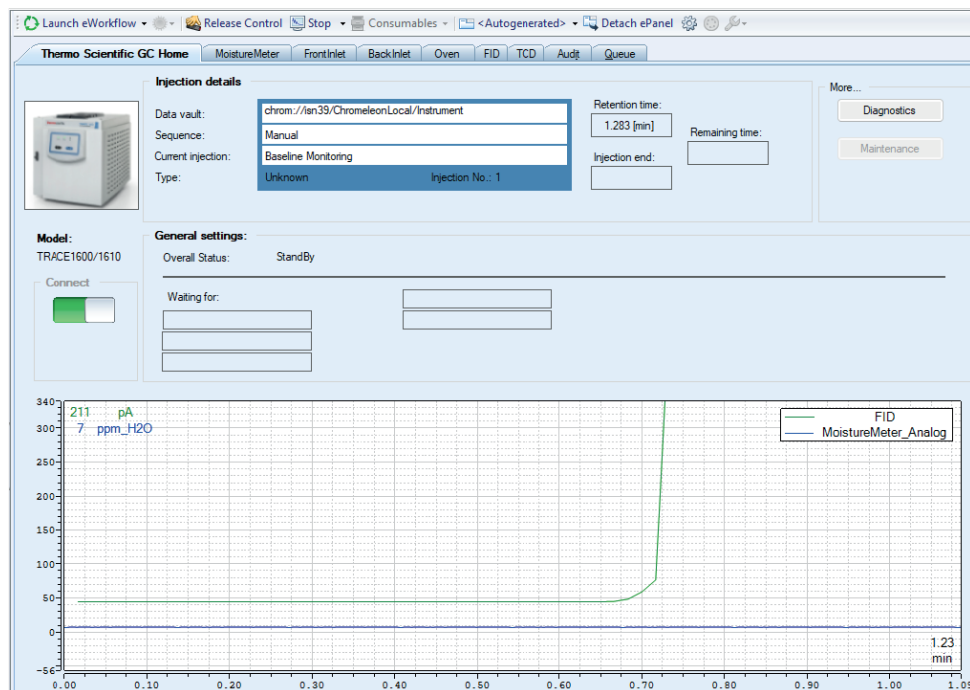


Figure 5 Chromeleon CDS acquisition settings and moisture level recording. Note (in the tabs) that the moisture meter is available as an extra data channel.

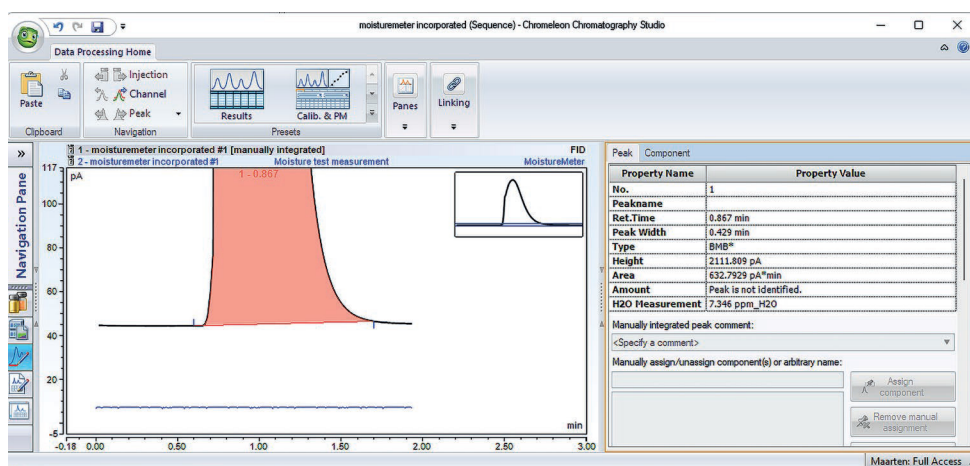


Figure 6 Chromeleon Studio window with FID signal (upper; black) and moisture meter signal (lower; blue), which is a steady-state level that corresponds to 7.346 ppm H₂O

Conclusion

The moisture sensor provides a valuable addition to conventional GC measurements, extending analytical capabilities across a wide concentration range from sub-ppm levels up to 25%. This broad dynamic range enables reliable monitoring of both trace and high-concentration components within a single analytical framework. Furthermore, integration of the sensor data with the Chromeleon chromatography data system allows seamless data acquisition, visualization, and processing alongside GC results. As a result, the sensor enhances measurement flexibility, improves process insight, and complements established GC-based analytical workflows.