Monitoring Compressed Air Quality Through Moisture Measurement

Compressed air is relied on heavily throughout the manufacturing industry. Condensation that naturally occurs when the air is compressed can cause damage to equipment and machinery, make its way into sensitive processes and dramatically shorten the life of air powered tools. The majority of compressed air drying applications are handled by refrigerant dryers, normally lacking the capability to measure the moisture content of their output. Measuring the dew point of compressed air on-line and at point of use provides assurance that dryer systems are working to provide protection against moisture.

When warm compressed air leaves the compressor it will contain a high moisture content in the form of water vapour. As the air travels through the compressed air distribution network it will begin to cool, and the water vapour will condense on cold surfaces it comes into contact with. The condensation can form in fittings and fixtures along the distribution pathway, or inside tools, equipment and machinery once the compressed air reaches it's destination.

The purpose of drying the air with a refrigerant dryer is to prevent the formation of condensation. To be effective the refrigerant dryer must dry the compressed air to a point where the dew point is lower than the temperature of the coldest surface that the compressed air could come into contact with at any point in the distribution network.

Condensation forming inside the distribution network will corrode pipework and fittings, over time reducing the smoothness of the inside surfaces, leading to pressure loss over time. Condensation can wash away the lubricant in air tools, and rust, scale and other dirt that is carried along with the water droplets can foul up tools, ultimately leading to shorter lifetimes or unexpected failures. Oil from the compressor that has entered the distribution network can be particularly nasty when it mixes with moisture, forming an acidic emulsified paste that is harmful to many industrial materials.

Refrigerant dryers are often fitted with a temperature sensor, which is thought to be comparable to measuring the dew point of the compressed air output. There are a number of reasons why the temperature may not be indicative of the true dew point:

- In the case of high flow rates, the entire mass of air passing though the system is not cooled to the heat exchanger temperature, making temperature measurement misleading.
- A steady flow of condensate from the drain will still be visible even when a drain system has become overloaded.
- Failed, blocked or faulty drain valves can lead to improper removal of water, leaving a fine mist in the compressed air output.

Measurement Technique

There are two main questions that arise when taking dew point measurements in a compressed air system:

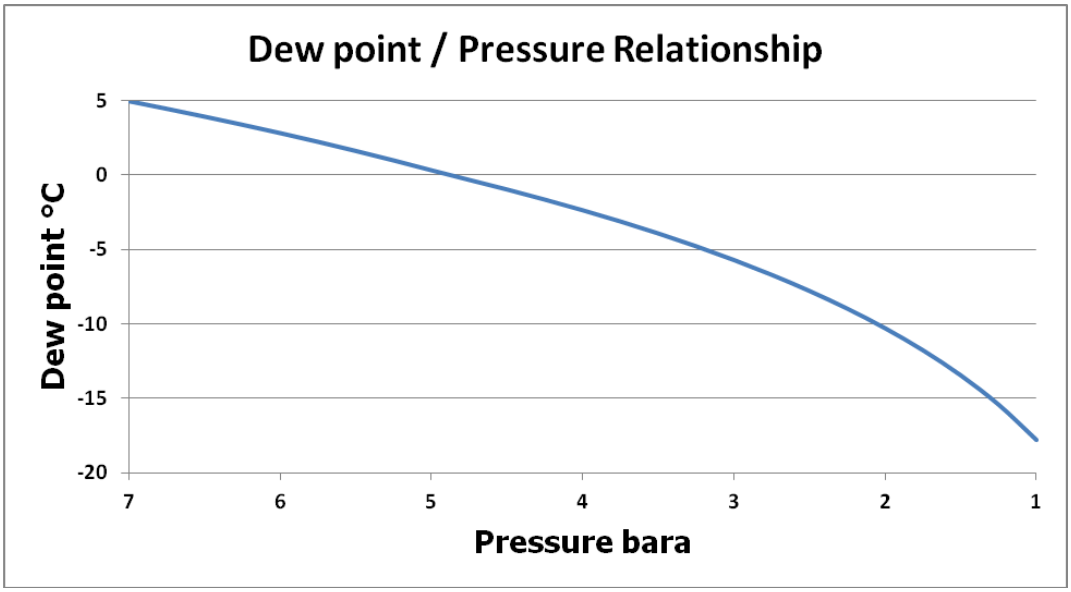
- Should the sample be measured at atmospheric, or at line pressure?
- Where should the measurement be taken? From the dryer outlet, or at the point of use?

Atmospheric vs Line Pressure

When measuring the compressed air from a refrigerant dryer it is often recommended to measure at atmospheric pressure.

This is because as the line pressure naturally fluctuates due to varying supply and demand on the compressor, the dew point will directly be affected by these changes in pressure. The graph below illustrates the relationship between dew point and pressure, and shows a starting dew point of 5°C at a pressure of 7 bar.

If the measurement is performed at atmospheric pressure however, the pressure will always be constant, giving repeatable results independent of the current line pressure.



Point of measurement

The dew point will naturally vary between the outlet of the dryer and the point of use. Long lengths of pipe work can hold onto significant amounts of moisture and small leaks can allow further moisture to ingress into the compressed air supply.

A fixed, on-line dew point transmitter can be situated on the dryer outlet to provide constant measurement of air quality. To measure the dew point at the points of use, a portable dew point meter may be more suitable, however the low cost of dew point transmitters makes it feasible to also fit them further down the distribution network.

SF52 Dew-Point Transmitter

Ideal for on-line, at pressure measurement at the refrigerant dryer outlet, this low-cost transmitter features fast response time and long term stability.

Key Features

Measurement Range (Dew point)	-40 to +60°C or
-40 to +140°F	
Accuracy	±2°C (±3.6°F)
Stability	<1°C (<1.8°F) / year
Response Time	< 10 sec (90% step change)
Thread	G ½" BSP or ½" NPT
Output Signal	0-1, 0-5, 0-10 V or 4-20 mA

For more information on the SF52 Dew-Point Transmitter please visit our website www.michell.com

MDM50

Perfect for performing high speed spot checks on compressed air at point of use, with interchangeable fittings supplied as standard allowing for both atmospheric and at pressure measurements as required.

Key Features

Measurement Range	-50 to +20°C dew point
Accuracy	±2°C
Display	Super Bright 7-Segment LED
Case	IP67, Lifetime Guarantee
Battery Life	> 12 hours
Output Signal	4-20 mA

For more information on the MDM50 please visit our website www.michell.com

Easidew Portable

Perfect for performing spot checks on compressed air at point of use, with interchangeable fittings supplied as standard allowing for both atmospheric and at pressure measurements as required.

Key Features

Measurement Range	-100 to +20°C dew point
Accuracy	±2°C
Display	Super Bright 7-Segment LED
Case	IP67, Lifetime Guarantee
Battery Life	> 12 hours
Output Signal	4-20 mA

For more information on the Easidew Portable please visit our website www.michell.com

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