

Measuring Moisture (*dewpoint*) in Compressed Air Applications

In most manufacturing facilities, compressed air serves a multitude of applications, such as powering air tools, operating pneumatic cylinders for automation, cooling components, driving valves and mechanical elements, purging enclosures, cleaning, blowing-off, and conducting pressure testing etc.

The air quality required for each application varies significantly. Compressed air can be broadly categorized into three classes based on dryness and cleanliness: **Shop Air**, **Plant Air**, and **Instrument Air** (informal industry terms).

Shop Air, the least pure, contains the highest moisture content and typically undergoes only rough moisture separation, often using a condensate drain on the air tank.

Plant Air, on the other hand, is more refined as it is usually filtered and passed through a refrigeration dryer to reduce moisture.

Instrument Air represents the highest level of air purity, achieved through meticulous filtration and desiccant dryers.



Compact Dewpoint Sample System with Integrated Filter

Compressed air can be dried using different methods, including **refrigeration**, **regenerative desiccant**, or **deliquescent dryers**. **Refrigeration dryers** chill the air, causing water to condense and be drained away.

The air-to-air heat exchanger pre-cools the incoming air, preventing condensation on the piping. The refrigeration coils then further cool the air, leading to water condensation, which is subsequently drained. Careful control is maintained to prevent freezing of the unit by keeping the coils above 3 °C.

Regenerative dryers (heatless) use desiccant towers filled with a chemical desiccant that absorbs moisture from the air. There are two types: 'heatless' or 'pressure swing' dryers, employing two towers alternately drying the air and regenerating. The drying process occurs in one tower, while the other undergoes regeneration through reduced pressure, lowering its dew point below the dryer's and removing moisture. The cycle can be controlled by a timer or a more advanced moisture sensor-based system.

The heat-regenerated dryer follows a similar principle but uses external heating, such as steam, gas burners, or electricity, to accelerate the regeneration process. A cool-down cycle is integrated into the control sequence to prevent overheating of the air for plant use. Dewpoint Transmitters with cooling coils (*See illustration on page 2*) are advised for systems using this type of dryer.

Monitoring of both **regenerative dryers** is effectively carried out with trace moisture analyzers from **Alpha Moisture Systems**.

Deliquescent dryers (heatless) are single-tower units charged with an absorbent salt that attracts and gradually dissolves moisture. Periodic draining of water and recharging the chemical occur approximately every couple of months.

As businesses expand, their demand for dry air increases, potentially surpassing the dryer's capacity. In such cases, water

and air may start pumping through the system, risking freezing of the lines, especially when exposed to cold weather. To prevent freeze-ups and ensure system efficiency, investing in dewpoint monitoring equipment, such as **Alpha Moisture Systems Dewpoint Instrumentation**, proves highly beneficial.

The additional advantages of these dewpoint instruments include being able to schedule maintenance on demand, predict the appropriate time to invest in additional dryers, and monitor the start-up of new dryer installations.

Typical installations for continuous monitoring consist of an **AMT or PDT Dewpoint Transmitter** in a Sample Cell (*Sensor Holder*) and a single-channel **DS1200 or DS4000** dewpoint analyzer placed at each dryer outlet.

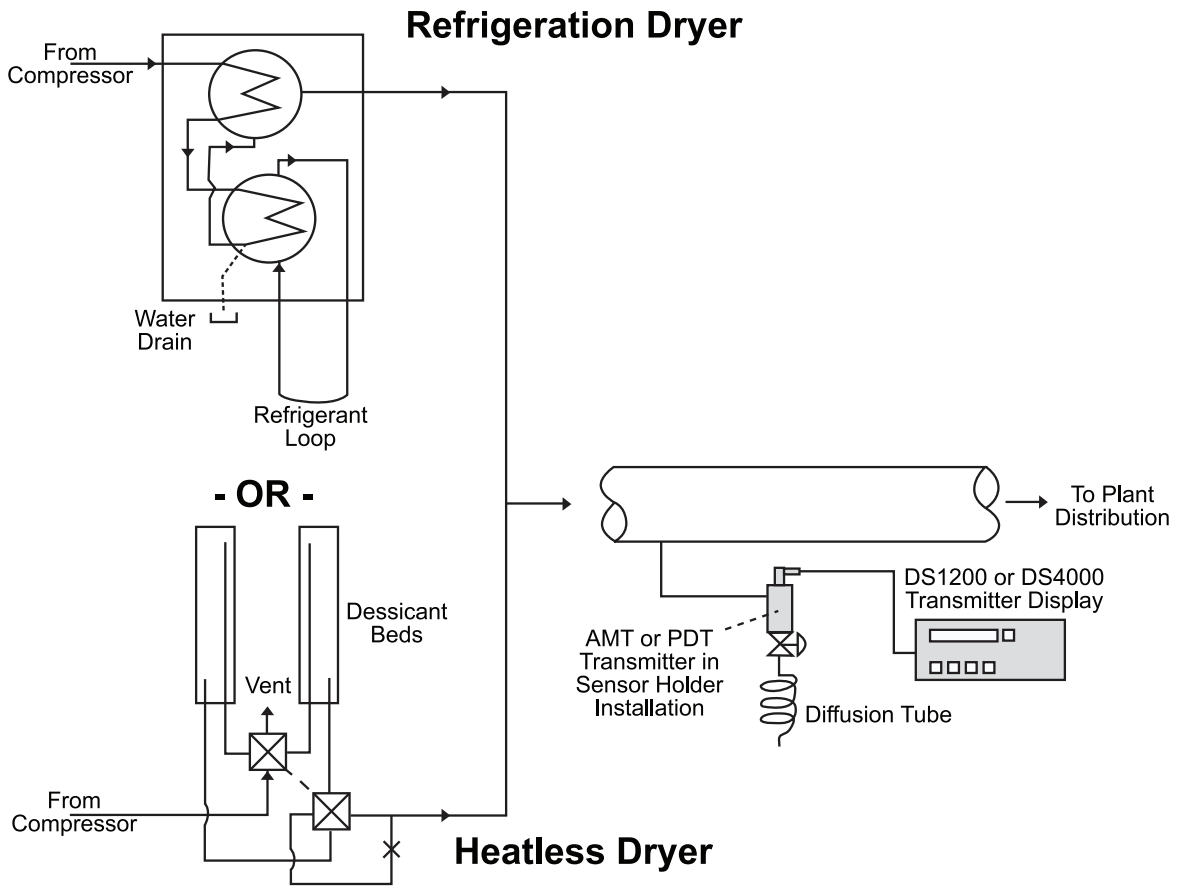


Recalibration of the transmitters is recommended annually unless exceptional circumstances necessitate more frequent calibration.

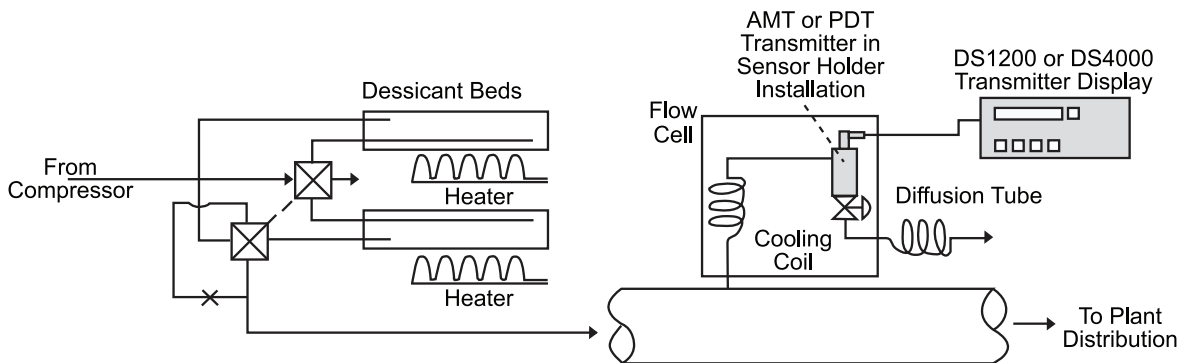
Conclusion:

Compressed air is a valuable industrial gas that can be used in a wide variety of applications. By using dewpoint monitoring, it is possible to ensure that the compressed air system is operating efficiently and reliably.

Dryer Illustration Examples



Heat Regenerated Dryer



Alpha Moisture Systems' have over 30 years experience in the design and manufacture of dewpoint sampling systems in compressed air applications, from standard to complex.

Contact our Technical Sales Team for more information and expert advice, or visit our website: amsystems.co.uk