듀콤이나듀레인저를사용하여

압축공기의 수분을 감시하고 제어

겉우트레이딩 1984

Monitoring and Control of Compressed Air

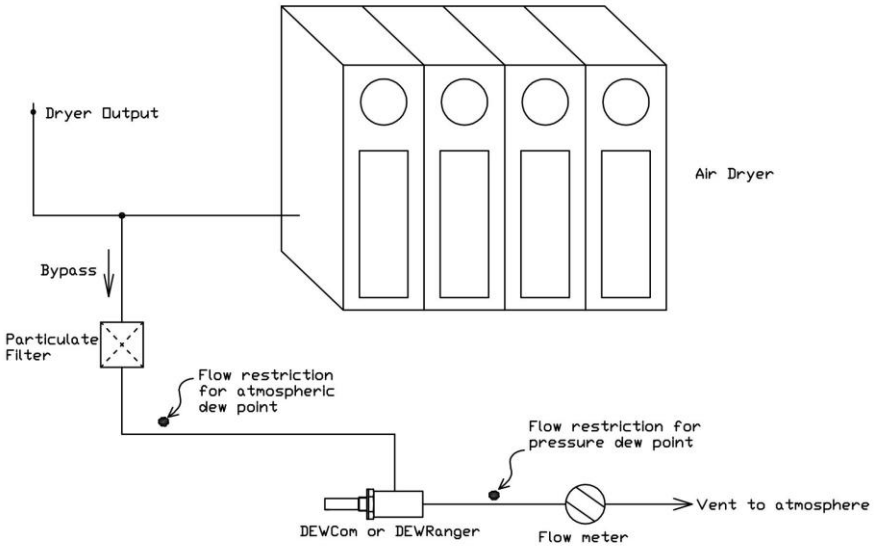
Many manufacturing processes require a constant supply of compressed air. The air may be used for many different purposes - for example the actuation and control of pneumatic valves, cylinders and controllers; powering pneumatic instruments in plants, operation of machinery; as a transport medium for bulk materials; or as a purge gas. Compressed air always contains some moisture which, if uncontrolled, could potentially cause damage to the process, pneumatic controls, tooling, finished product, or indeed the components of the air distribution system itself.

To reduce the likelihood of these problems occurring, compressed air supplies are often conditioned to significantly reduce moisture, before the air is used in the required process.

Refrigerant dryers are commonly used to reduce the moisture content of compressed air. In principle the compressed air is cooled in a heat exchanger to a temperature just above the freezing point of water, causing much of the moisture in the air to condense out to liquid, which can then be drained off. Efficient operation of the dryer is dependent on maintaining good temperature control at close to 0°C in the heat exchanger and upon the design of the heat exchanger itself. If the temperature drops below 0°C, ice will form on internal surfaces and dryer performance will be reduced. Refrigerant dryers are normally equipped with temperature sensing devices to monitor the outlet air temperature. This temperature measurement gives a first indication of the moisture content of the compressed air, but does not guarantee the quality of the air at the dryer outlet. The only way to be certain that the dryer is functioning correctly is to measure the moisture content of the outlet air directly using an appropriate hygrometer.

Regenerative desiccant column dryers can offer a very efficient method of air drying. These dryers are normally configured in twin columns, allowing one column of desiccant to be regenerated while the other is performing the air drying process. There are two common types - pressure swing and heat regenerative. A pressure swing dryer uses a sudden drop in pressure of the column under

generation to evaporate moisture from the desiccant, which is then flushed out of the column to atmosphere by a back purge of air from the column under load. In the case of heat-regenerative dryers, large electrical or steam heaters are used to regenerate columns of saturated desiccant material and in such cases energy efficiency is of prime importance. As the demand made on the dryer may vary, it is advantageous to control the dryer cycle timing according to the output performance required - rather than simply on a fixed time interval, as is often the case. By monitoring the moisture content of the common dryer outlet using a hygrometer, this information can be used not only as a quantitative measurement, but also to initiate the dryer cycle change-over point at a pre-determined moisture level. This method of operation is often referred to as a "dewpoint demand system" and it provides the user with significant energy savings as well as assuring a consistent quality of dry air output.



It is common for a portable hygrometer to be used for spot checking air quality where there are multiple usage points or long air line runs from compressor to working location. For on-line measurements either a dewpoint transmitter or hygrometer with display may be implemented dependent on whether the user wishes to transmit to a data acquisition system or simply provide a local display of the measured dewpoint. Increasingly, transmitters are used for this application, being easy to install, relatively low in cost and offer a range of industry standard output signals suitable to control the function of the air dryer.

Measurements may be made either at full line pressure or at atmospheric pressure, depending on preferred working practice. The diagram shows an example of an on-line hygrometer measuring the output of an air dryer after a particulate filter. Correct positioning of flow and pressure regulation will facilitate measurement at either line pressure or atmospheric pressure. A suitably ranged flowmeter after the sensor provides an on-going indication that an adequate flow rate is achieved across the sensor.

The sampling arrangement for a portable hygrometer would be much the same, and Stork Instruments can provide ready-made solutions for its portable hygrometers. An example of a suitable sampling system is shown here.

It is important that good sampling practice be observed in making these measurements. Sample tubing should be of good quality stainless steel, preferably 3mm or 6mm O.D. with high quality fittings. In the event that a flexible connection is needed, a tube of thick-walled PTFE should be employed. Tube lengths should be kept to a minimum to ensure fast response and there should always be a tail-pipe after the sensor to ensure that back diffusion of ambient air does not compromise the measurement. Filtration is also normally recommended for compressed air applications..

The **STORK DEW*Com*** offers an ideal on-line continuous measurement solution for this application while the **STORK DEW*Ranger*** is an easy to use portable measurement option with data logging facilities.

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