Technical Bulletin 60

Instrument Air System

by Brian S. Elliott

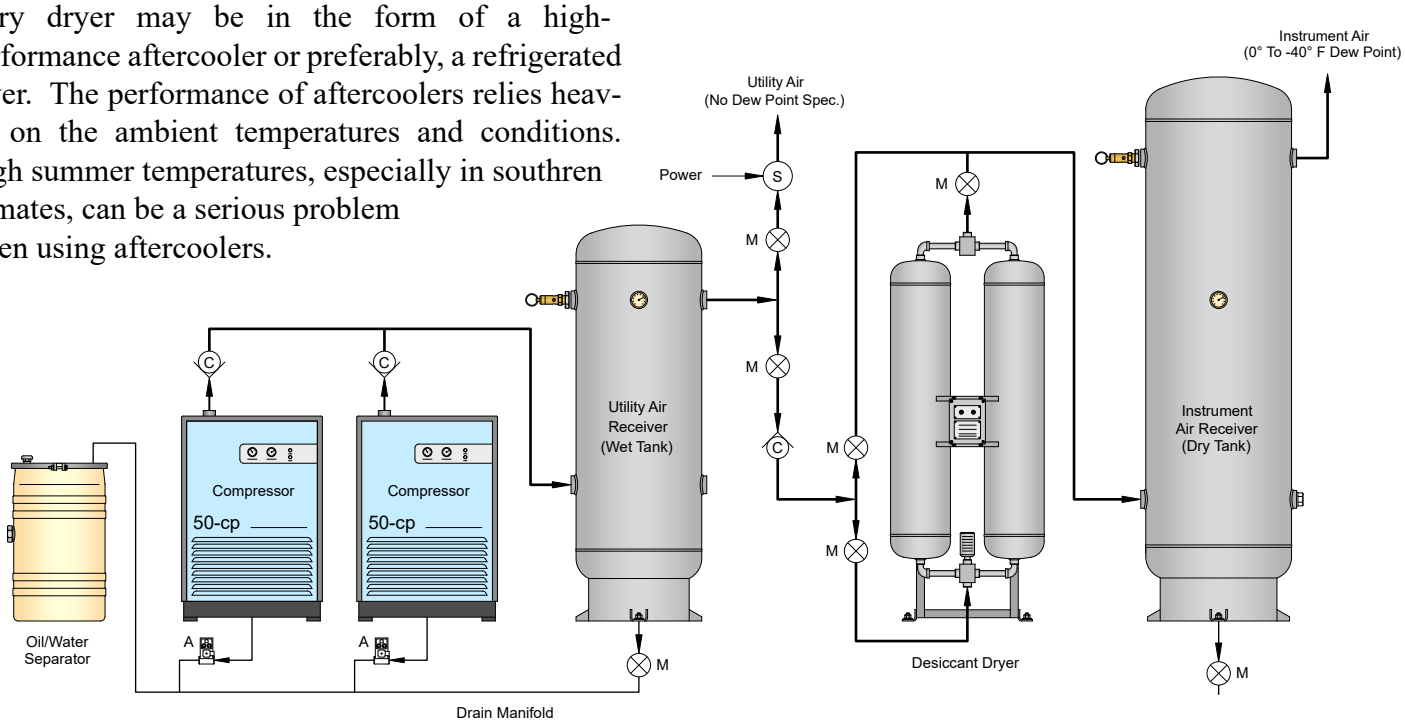
Refineries, chemical plants, semiconductor manufacturing facilities and food processing installations, etc. typically specify instrumentation quality air for their pneumatic control systems. Instrument air is generally specified at -40°F dew point. Many of these systems also incorporate a utility air output, which generally does not carry a dew point specification. The utility outputs produce notoriously poor air quality and, in many cases, even the instrument air is of poor quality due to a lack of maintenance or inadequate design of the compression package.

The illustration below shows a typical instrument air system. These systems normally consist of a compressor(s), a wet tank (which also serves as the utility air receiver, aftercooler, and water separator), a regenerative "twin tower" desiccant dryer and a dry tank.

Systems laid out in this manner have several significant drawbacks. Because the wet receiver has very little effect on the discharge temperature of the compressor, it can only separate gross water and oil contamination, forcing the desiccant dryer to act as a primary dryer and to carry nearly the entire water and oil load from the compressor discharge. This places the desiccant charge in a situation that it is not actually designed to handle. Consequently, the effective life of the media is significantly reduced. Most users set up an aggressive regeneration cycle in a vain attempt to compensate for this overload condition, but this is only a Band-Aid applied to a far more significant problem.

Oil contamination is particularly detrimental to the charge. Oil-contaminated desiccant cannot be regenerated and eventually will become completely saturated, rendering the dryer ineffective and forcing the user to replace the charge. Additionally, and especially in southern climates, the temperature that the dryer receives is oftentimes too high. This has the effect of prematurely saturating the desiccant and the net result is that the output air has a water content that is significantly higher than the required specification.

To correct these and other drawbacks, the desiccant dryer should be placed as a secondary dryer only. The primary dryer may be in the form of a high-performance aftercooler or preferably, a refrigerated dryer. The performance of aftercoolers relies heavily on the ambient temperatures and conditions. High summer temperatures, especially in southren climates, can be a serious problem when using aftercoolers.



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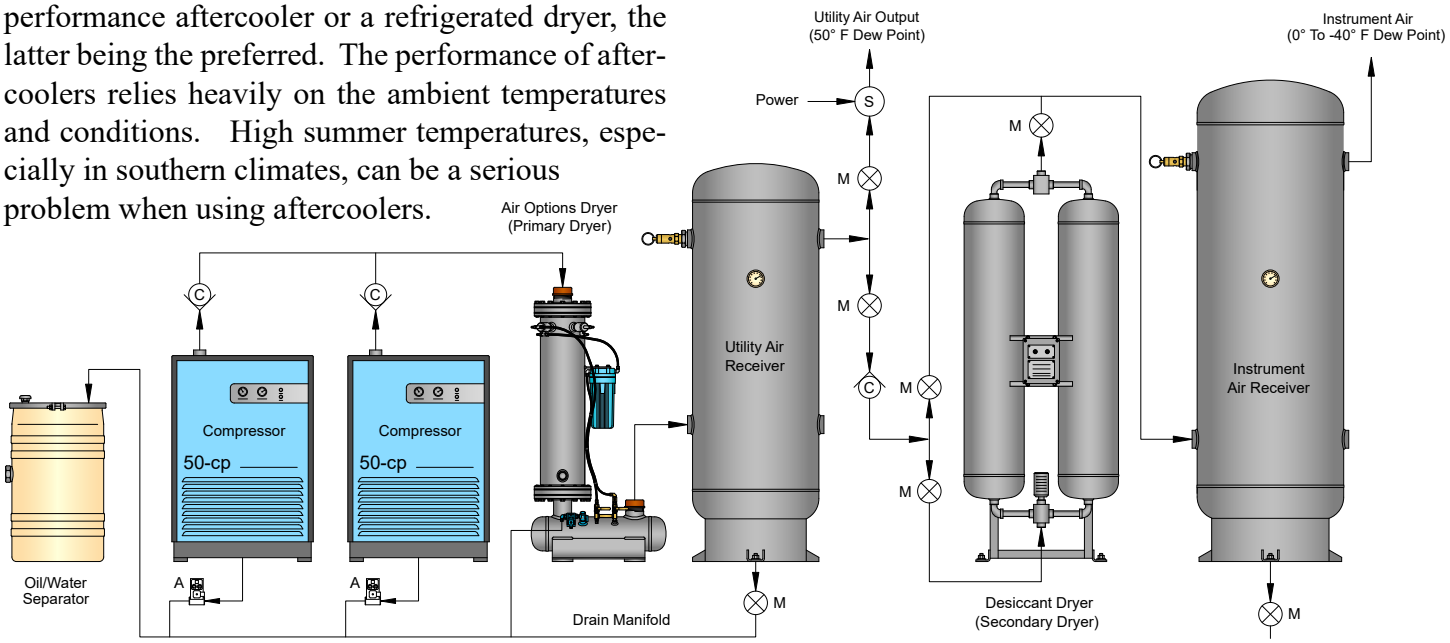

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