

Mind The Gap

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Control Gap Explained

[Variable speed control compressors](#) [1] can be an important component of an optimized system provided that it is properly applied. Variable speed is not, however, a simple panacea for instant compressed air system efficiency. The dynamics of the control must be understood and the machines properly sized.

When designing a compressed air system, if the control range of the variable speed compressor is not considered, this can result in one or more compressors operating in an inefficient manner. Fixed speed compressors may excessively cycle between load and idle, variable frequency compressors may ramp up and down –or both at the same time. When these types of events occur, the plant staff often refers to the compressed air system as “out of control”, and an unusual pressure fluctuation in the facility persists which can affect production. This is commonly referred to as a “control gap”. Often times the cause is selecting a variable speed compressor that is the same size or smaller than the fixed speed machines in the system.

The control range of a variable speed compressor is critical to avoiding a control gap. When one or more fixed speed compressors is sized within the variable speed compressor’s control range, the control gap can be avoided.

Below is an example system with a 150 hp variable speed drive compressor and two 100 hp fixed speed compressors. The maximum flow of the 150 hp variable speed compressor is 735 cfm-fad at 110 psig and the minimum speed is 150 cfm-fad, therefore the control range of the variable speed compressor is 585 cfm-fad at 110 psig. The two fixed speed compressors are both rated for 497 cfm-fad at 110 psig and therefore fit within the control range of the variable speed compressor. As can be seen in the graph, the system can provide a steady operating pressure throughout the flow range of the system as long as the system is properly controlled with a [master controller](#). [2]

This blog entry is an excerpt of a published whitepaper. To download a complimentary copy of the complete whitepaper, “Applying Variable Speed Compressors in Multiple Compressor Applications”, visit www.kaeser.com/whitepapers [3].

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Links:

[1] http://us.kaeser.com/Products_and_Solutions/Rotary-screw-compressors/with-variable-speed-drive/default.asp

[2] http://us.kaeser.com/Products_and_Solutions/Controllers/SIGMA-AIR-MANAGER/default.asp

[3] <http://www.kaeser.com/whitepapers>