

FAQs

Frequently Asked Questions – System Controls

There are several different methods, known as capacity control methods, that a compressor uses to match its supply with the compressed air demand and keep the system at a stable pressure. Although all capacity control methods match supply to demand, some accomplish this more efficiently than others. Operating one to two compressors using only their onboard controls to maintain a stable system pressure is relatively easy, but when the compressor number exceeds two, the task becomes extremely difficult. Systems with multiple units of any type (or mix of types) can experience wide swings in system pressure. This is when a system controller is required to manage the operation of multiple compressors to deliver stable pressure, efficiency, reliability, and productivity to a compressed air system.

Below are answers to frequently asked questions regarding the capacity control methods in use today on contact cooled rotary screw compressors:

Q: What do we mean by online/offline, also known as load/no-load?

A: This is a capacity control method that operates fixed speed compressors either at full capacity (online or loaded) or at zero capacity (offline or un-loaded) utilizing a pressure switch to control the loading and un-loading of the compressor. As an energy-saving step, a timer is often added to switch from un-loaded operation to full stop. Pressure band and timer values are preset to match system requirements. Reducing backpressure on the airend during un-loaded operation further increases the efficiency of this capacity control method.

Q: What is variable frequency speed control?

A: Air flow is varied to maintain a targeted discharge pressure (control pressure) by varying the speed of the airend, achieved by changing the speed of its drive motor. Motor speed changes are affected by electronically changing the frequency of the power that drives the motor. Variable frequency speed control, VFD or VSD, are the most advanced type of compressor control and deliver the most energy-efficient part load operation for a rotary compressor.

Q: What do we mean by modulation control?

A: Air flow is controlled through the action of a throttling inlet valve that regulates the amount of air delivered to the system to provide a constant output pressure in response to a pressure signal from the compressor discharge. Although modulation is a simple and common form of capacity control, compressor efficiency suffers significantly as the capacity of the compressor decreases in part load operation. This is due to an increase in compression ratio as capacity is reduced.

Q: I have heard about rotor length adjustment, what does that mean?

A: Fixed speed compressors are available with valves along the length of the airend that regulate the length of the compression chamber, thus varying the displacement of the airend. In response to a pressure signal from the compressor discharge, valves progressively open or close internal bypass ports in the airend, varying flow to maintain a stable system pressure. Normally only available on 50 hp compressors and larger, rotor length adjustment (Turn Valve, Slide Valve, or Lift Valve) provides for part load efficiency that is greater than that achieved with modulation due to the fact that this capacity control method does not affect the compression ratio of the compressor.

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