



# Surge Tuning

## For Centrifugal Air Compressors

### WHO WE ARE...

Bay is an energy solutions company that provides products and services to a broad range of industrial, commercial, and government customers. We provide cost savings for our clients through increased energy efficiency, improved system management, better reliability, and reduced downtime. Founded in 1983, Bay provides over 1.8 terawatt-hours (1,800 million kilowatt-hours) of annual energy savings for our customers in 70 countries. Our headquarters and network operations center is located in Maumee, Ohio.

### OTHER PRODUCTS

**Bay Compressor Controller**  
Industry leading controls for all rotary screw, reciprocating, and centrifugal compressors.

**BayWatch®**  
Web-based hosted monitoring and alerting system for single and multi-plant applications.

**BayView® Server**  
Full featured, HMI/SCADA system for air compressors controlled by the Bay Compressor Controller.

**BayView® Scheduler**  
Advanced scheduling system, automating compressor schedules and operating conditions.

**BayView® 20/20**  
Customizable HMI/SCADA system for integrating varying plant systems.

**Custom Controls**  
Advanced customized systems for cooling towers, dryers, and other industrial applications.

### Why Surge Tuning?

The surge process in centrifugal compressors is very complex and can be hazardous to the health of the compressor, resulting in unnecessary energy and maintenance expenses. A solution to the surge phenomenon calls for studied experimentation on the individual compressor.

Bay's surge tuning solution involves a recreation of the surge process under controlled conditions. Using the information from that study we develop control parameters that can establish a stable operating range for the compressor.

Many compressor operational factors can benefit from surge tuning. For example, when operating in modulate, the inlet valve low-limit-closure depends on discharge pressure and inlet temperature. Both are critical to the performance and reliability of an air compressor. Another essential component to compressor performance is the set-pressure. When the compressor's set-pressure is too low, the compressor could experience a quick emergence to surge (known as low flow surge) while throttling. When pressure is set too high the compressor's turndown would be greatly affected, resulting in operation at a higher than necessary set-pressure and blow-off. Both factors are a major source of wasted energy. Surge tuning includes testing of these functions and sets them for optimal performance.

With these factors in mind, periodic surge tuning is a necessity for centrifugal air compressors. For maximum benefit, surge tuning should be completed every 18-months and every time the machine is overhauled. Tuning is also recommended after replacement of a part that could affect the characteristics of the compressor, such as an impeller, diffuser, or after a simple clearance adjustment.

### About Surge Tuning

The surge tuning service begins with an experienced Bay engineer coming to your compressor site. The Bay Compressor Controller unit is central to administering the tuning and testing via the Bay Compressor Controller Software (CCS). Under restricted conditions, the compressor is forced into surge and the results are documented.



Those surge test parameters are then entered into the CCS and all control existing loops are fine tuned. Often, when compressors are surge tested, any advanced upgrades or enhancements for the Bay Compressor Controller will be included in the surge tuning package.

Compressor performance testing provides you with the opportunity to learn more about the operation of your centrifugal air compressor. Often, after testing, the turndown or *throttle ability* of a compressor may be significantly enhanced resulting in a corresponding reduction of horsepower consumption—*bottom line*—energy cost savings. Testing also sets a baseline of the compressor's current condition. You can use this information for comparison to future surge tunings to identify wear and tear of the unit. And, when done on a scheduled, periodic basis, surge testing can reduce the cost of machine maintenance and help identify catastrophic failures before they occur.

If you're interested in optimized compressor performance, a reduction in maintenance expenses and increased energy efficiency, Bay's surge tuning service is the solution for your centrifugal air compressor. Call Bay today to learn more or to schedule a surge tuning appointment.



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