

Application Profile



Significant Energy Savings with AC890PX on factory air compressor

A rotary screw compressor in a manufacturing plant was using a large amount of energy, as its capacity exceeded the required output of compressed air during long periods of time. Running six or more days per week for 2-3 shifts made the 200 HP compressor, an Ingersoll-Rand EP200, a major consumer of electrical power, and a candidate for optimization.

While an energy audit revealed some minor leaks, fixing them resulted in only 2% improvement. However, the audit also revealed that the operation of the compressor was not optimized to the typical needs of the plant, and suggested that an AC adjustable speed drive could help remedy the situation.

Air compressors run most efficiently at full output, but there is seldom a demand for full output over a period of time. For that reason, the pressure must be regulated. There are several “traditional” methods of controlling pressure on a rotary screw compressor.

- **On/Off operation - the motor is started and stopped to maintain pressure.**
- **Load/Unload - the input air valve is opened or closed to maintain pressure while the motor continues to run at full speed.**
- **Modulation - the input air valve is controlled proportionally to maintain pressure while the motor continues to run at full speed.**
- **Geometry Control - displacement of the compression chamber is reduced to lower pressure while motor runs at full speed.**

All of these traditional methods of pressure regulation have shortfalls. On/Off operation results in mechanical wear and tear, and can also produce high peak demands every time the motor is started. It has largely fallen out of favor, especially in higher power applications. Load/unload is somewhat more efficient, but even during unloaded operation the motor draws about 25% of its full load current while doing nothing. Modulation provides a better alternative, but during periods of low demand, power consumption is nowhere near proportionately reduced with respect to full load operation. For example, at 80% capacity, the power required only about 5% less than at full load. Geometry control is somewhat better than modulation, but still does not yield energy savings proportional to demand.

The most efficient alternative is to regulate the speed of the motor using a variable frequency drive. By doing so, the power consumption is reduced nearly proportionately to the demand. In other words, at 80% capacity, only about 81% of the full load current is required. This equates to a 14% REDUCTION in energy usage over the widely used valve modulation approach.

To accomplish the goal of achieving the best efficiency, a 200 HP AC890PX adjustable speed drive from SSD Drives Division was installed. Lowering the speed of the compressor (within the recommendations of the compressor manufacturer) to the optimum speed required to maintain the required pressure lowered its electrical consumption as well. Cycling was eliminated, and the system became much simpler as well.

Installation was easy, thanks to the AC890PX design, which includes AC disconnect, line fuses, and 3% line reactor. Interfacing with existing compressor controls was done in-house with the assistance of a distributor.



Factors contributing to our success in this application included:

- Past history of successful AC890PX installations on different applications
- Commonality of replacement parts with other installed drives
- Fast and easy commissioning, as proven by experience

Benefits to the customer included:

- **Energy savings of 22%** (Payback in under a year)
- Less wear and tear on compressor components due to soft, controlled starts and elimination of cycling
- Lower peak demand for electric power due to soft starting
- Noticeably quieter operation
- Improved power factor – drive includes 3% line reactor standard
- More reliable operation through power anomalies

“The air compressor is very, very much quieter...we have all been impressed with this change.”

Alan Legett, Div. EHS Manager

About the AC890PX:

A high power AC Flux Vector drive with unique modular design, the AC890PX series is available in ratings from 150 HP to 600 HP. Input voltages of 380, 415, 460, 575, and 690V are part of the standard offering. The AC890PX can be applied to induction motors (with or without feedback) and PMAC servo motors. Dynamic braking switch and resistor are included, as is an AC line disconnect, 3% AC line reactor, and programming keypad, all at no additional cost. Top or bottom power entry models are available to suit the installation. Pluggable Powerpak Modules make field servicing easy, are lightweight, and can be installed without requiring a service call. For smaller compressors, the AC890 is available.

- Ready to install, with no additional components required.
- Converter and phase modules plug-in for less downtime
- Standard models accept 380, 415, 460, 575, or 690 VAC
- 3% AC line reactor included at no additional charge
- 6-Pulse, 12-Pulse, 18-Pulse, or Active Front End options available



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